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STEEL CONSTRUCTION

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Photography by Artificial Light.

[Prepared for the JOURNAL, by MR. ADOLPH M. BERG.]

In the active strife underway which marks the present epoch, a prominent feature is the search for means whereby the 24 hours of each full day may be utilized. In the days of the tallow dip our forbears were content to close the affairs of the day with the setting of the sun. Not so, however, with the present generation. To day, with its plethora of artificial illumination, humanity is lured to the great white-ways of our cities, to keep it up for the best or largest parts of the 24 hours, even though, as was written years ago, "Yonder faithless phantom flys to lure thee to thy doom." However, to meet the demands of these pleasure-seekers, inventors have so greatly prolonged these light times that some places are in reality never closed, all of which is made possible by modern developments in the plan and method of employing artificial light. While almost every class of business has been benefited, one that suffered most, for lack of the dispelling of darkness, was that of the photographer. But he has no longer any need for worry on that score, for the lighting specialist and physicist have, through unanimity of action, very easily made photographing, by and in the dark hours, possible by means of artificial lighting. Manufacturers of electric lamps have improved their wares up to a certain stage, but it was impossible with them to attain the desired result. The tone of the pictures so taken had a certain harshness, being deficient in the softer tones so requisite to a finished portait. Further, the maintenance of these lamps, and the operating plan, too, are rather expensive. This field of opportunity is right before the gas man, and it remained for an enterprising, progressive photographer, resident in Jersey City, N. J., to ask a lighting specialist whether it wasn't possible to equip his studio to satisfactorily enable him to take portraits at night. The gas man, possessed of some knowledge as an amateur photographer, combined with his experience as a lighting specialist, designed the installation shown in Fig. 1. That was installed October 1, 1911, and it has been

Fig 1.

used continuously since then, many of the portraits taken being really superior to those taken in daylight hours. At the time this installation was made, regular, commercial, white light mantles (½ per cent. cerium) were used, but the Welsbach Company in time produced a mantle known as the "Photo-Lite," which was substituted for the mantle first used. A careful study was made of the conditions that would most closely duplicate day light illumination. This particular studio had a northern exposure, getting the light that is most desirable for photographing. The gas installation is just the reverse of this, the artificial light coming from the southern side. Thus the only change in conditions for the photographer is that the light strikes the subject from the opposite side. The light is well-

distributed and diffused. The details in the photograph are well defined, and the roundness of the features, so essential in a portrait, is well preserved by the proper directing of the light rays. The lens was of the speed ordinarily used for portrait work, the exposure being about 2 seconds. The volume of light can be controlled by shutting off any not desired, or screening the lights, similarly as may be done with daylight. The plan and elevation of the lighting arrangement are suitably shown in Figs. 2 and 3. This plan is conceded to

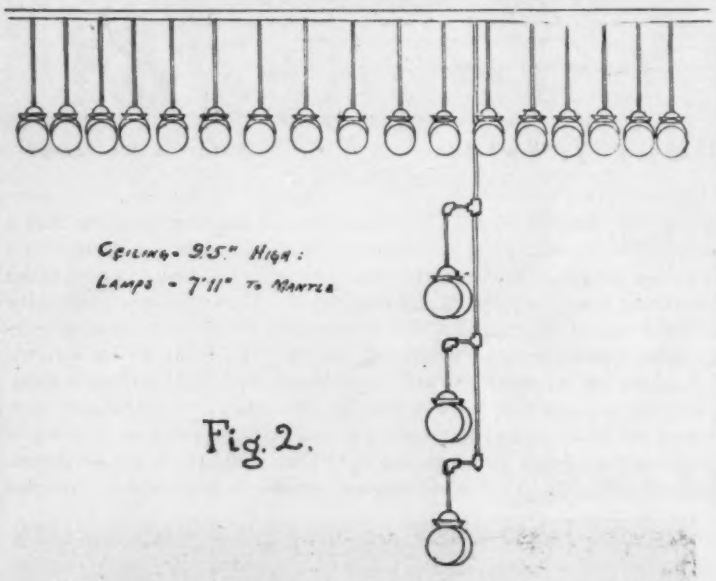

Fig. 2.

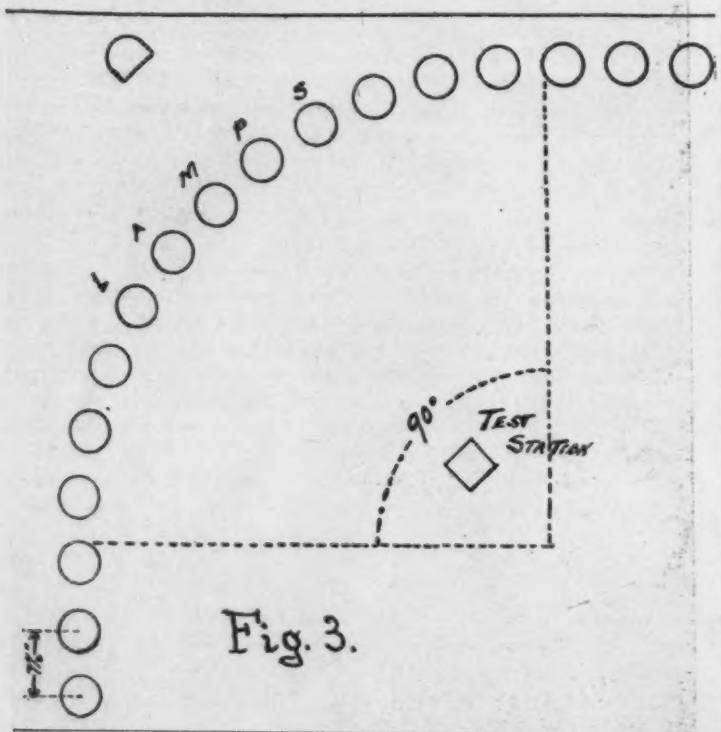

Fig. 3.

be the proper method of lighting for a studio. The ceiling lights are hung from a quarter circle of 1¼-inch pipe, 7 feet 1-inch long. These 17 No. 713 reflex lights are equipped with No. 335 metal angle reflectors, and the 3 No. 713 reflex lights on the side wall have a special metal diffusing reflector. These latter serve to break up any harsh shadows from large hats or other causes. The number of lights used in this installation are probably the minimum that should be used with a view to securing good results. No attempt was made to approximate the candle power of daylight, with its specific intensity of 200 to 500-candle power per square foot, the sensitiveness of the plate and the actinic value of the light enabling the designer to secure the desired results with a much lower candle power. The installation is so designed that the number of lights may be increased if desired, thereby decreasing the length of the exposure. To ascertain what results were being had, candle power readings were taken with a Sharp Millar portable photometer, and the figures are probably correct to within 5 per cent.:

Vertical Plane.	Foot Candles.	Per Ct. of Total.
Horizontal lights, burning	14.3	73.7
Vertical " "	5.1	26.3
Total	19.4	100.0
45° Plane.	**Foot Candles.**	**Per Ct. of Total.**
Horizontal lights, burning	23.2	85.6
Vertical " "	3.9	14.4
Total	27.1	100.0

The gas pressure varied during test from 1.8 to 2.2 inches water pressure. The following letter from the Manager of the studio narrates his experience:

THE REMBRANDT STUDIO,
JERSEY CITY, N. J., June 20, 1913.

A. M. BERG, Dear Sir: The lighting installation for photography by gas light, arranged by you a year ago last October, has proved satisfactory in every way, and the results obtained have been all that could be desired. From my experience and observation regarding artificial light for photography, incandescent gas light, as installed by you, gives the nearest approach to daylight. Our greatest difficulty heretofore has been to get a proper diffusion without waste of light. Thanking you for the interest you have shown in this matter,

I am, respectfully yours, EDWARD EDSALL.

In the installation shown in Fig. 1 a careful study was made of the issues involved in duplicating.

[CONTINUED FROM VOL. XCVIII., p. 423.]

PROCEEDINGS, NINTH ANNUAL MEETING, IOWA DISTRICT GAS ASSOCIATION.

HELD AT BURLINGTON, IA., MAY 7-9.

FIRST DAY—AFTERNOON SESSION.

Discussion on the Crawford Paper, Continued.

The President—We will resume the discussion of Mr. Crawford's paper.

Mr. Vincent—A member mentioned the expense and trouble in changing price wheels, and I wonder if he didn't get some of his foreign population to do the work. We changed 12,000 price wheels in Des Moines in three weeks, and had about a dozen complaints respecting them. We had every make of meter that had ever been put on the market. We trained a bunch of young men for a few days, then turned them loose, with proper supervision, and the result was as stated.

Mr. Crawford—This paper has brought out the discussion that was intended. We are now changing price wheels on 2,200 meters, and two men change 50 a day without trouble. One make has to be brought in to solder a lug, but there are only about 300 of these. We never had an asphyxiation, and I think there are 100 accidents of that kind, with the ordinary meter, to 1 with the prepayment. Mr. Weisgerber neglected to say anything about the number of asphyxiations with ordinary meters. As to the method of handling the public. When a man comes to our office we go to the rate book and look him up. If he is rated all right, we push out both the prepay and ordinary cards, and ask him if he has any choice. Nine times out of 10 he will say that he wants the kind Mr. So-and-so has, and 90 per cent. of the meters put out are prepayments by choice, largely due to our encouraging their use. If he went into Mr. Weisgerber's office for a prepayment meter he would be told that they only put them in for dead beats. If we wanted to get out of the prepayment business, we could do it just as easily as we got into it. Mr. English's policy of junking his meters seems a foolish one. If a man has a prejudice against prepayments, no amount of argument will change his views. We never had a prepayment meter taken away. Some cash boxes have been pulled off, and in all cases save one very satisfactory settlements were made. When the people sign our application card they agree to protect our property, and they do look after it. If we didn't have prepayments our office expense on collections would be at least $250 to $300 a month more. We have the same force to-day that we had with half the number of meters, and collect on 4 times as many electric meters as we did before. One collector takes care of 2,700 electric meters, 200 or 300 prepay electric meters, and all the gas collections. Our meters are brought in at least every 3 years to be tested and painted.

The President thanked Mr. Crawford for his paper, which had brought out so useful a discussion, and then introduced Mr. H. G. Stillson, who read the following paper[1] on

IMPROVING OPERATING CONDITIONS IN THE SMALL GAS WORKS.

How many times have we walked into our neighbor's gas plant and said to ourselves, "How rotten!" and then figure that, if we had the running of it, we would do this and that, and produce a harmonious and handsome place. Do we think the same when we walk into our own plant every morning and evening? Oh, no! We have to foot the bills for the improvements there. When we bear in mind that from 50 per cent. to 60 per cent. of the entire cost to the consumer's burner is in the plant, we begin to wriggle and sweat, in that "swivel chair" that we are supposed to occupy, and figure results. We are continually trying to devise ways and means whereby we may save a cent here and a cent there, so that our stockholders and general management, *in absentia*, will believe us when we state that we are on the job night and day. This last is true of all. I am quite satisfied that there is not a manager present but will acknowledge that he figuratively "sleeps with his boots on;" and, were the Angel Gabriel to blow his horn at any period of the 24 hours of the day, the small works' manager, for one, will be ready and willing to go. The *picce de resistance*, meaning "tough meat," is plant labor cost, that produces the red on our general books, and is the real explanation of more than one sarcastic letter.

Shall I squeeze down the good, willing man's wages, so that he in a measure takes up the overhead slackness and non-profit of his worthless brother? That is poor policy. The really good man should be rewarded. We will be fair with him and give him enough additional duties or hours, so that he may by his pay check each month reckon his proper proportion of excellence over his brother. This satisfies the g od man and prepares him for the place of a deserter. In water gas plants, with small sets, it is often necessary to run a portion of the night, and an extra gasmaker must be carried, as it is not good business to work even a willing man 18 hours upon the floor day after day, althongh it *has* to be done in cases of emergency. This extra man adds costs in winter that he would not in summer, where service or main work easily takes or gives to the plant. Thus, in winter, he must be the all-around man, capable and willing to do any duty about the plant and must be paid the same or better than the other plant men. He can unload coke, coal, oil; screen coke; wheel coal; clean boilers and purifying boxes; take care of the steam lines; fill lubricators and pack pumps; and be "jack of all trades." He can be main and service foreman in the summer and keep a general eye upon the plant, under your instructions. Somewhat similar conditions obtain in the one or two-bench coal gas plants; and, in addition to the duties enumerated above, he can pump the city drips and care for freezeups in cold weather.

I find it pays to let the unloading of raw materials by contract, as it is cheaper and quicker. To this man the men at the plant must at times look for orders. If you have confidence in his judgment and sagacity, allow him to handle the balance of the works' crew, keeping always in touch with your views upon the matter at hand. Make him realize that he is carrying a portion of the responsibility, being careful that too much leeway is not given him, or a really good man may be ruined. The manager must be eternally vigilant, but must not exert this prerogative in a manner distasteful to his men He must use the spur, but not the whip. Do not cultivate familiarity, for sooner or later it breeds not always contempt but shiftlessness. I am not a believer in educating the plant product. Let the ones who desire help state the wish first, then give them all the assistance possible. A "good fellow" about a plant never gets results, neither will the "crab." You must know when there is too much help quickly, replacing poor material with good at every opportunity. System with swing to the work, in which every man knows and does, is bound to bring results.

Materials.—Preventing waste of the raw materials from which we make our gas, is, next to labor, the most important. For instance, too many checks cannot be made by the manager and his plant representative. Examine the car before and after unloading the oil, examining measurements and shortages; deleterious substances; gravity; leaks. And, above all, take care in handling this, now most dearest of all the basic elements of gas manufacture. The oil must be followed and checked from the tank car to the gas holder. Do not use even a trifle more in the set than is absolutely necessary. If you allow your gas maker to do so, it is waste pure and simple, and results in good money winging its way through the stack valve, during blow and run, and depositing excessively in seals, drips and relief holder.

Here it is well to take up the waste of water gas tar. It is used in different ways, such as burning under boilers or for paints, etc. Watch it and get the money out of it, as it is valuable, In this same way the coal, coke and other materials must be handled; nothing being too small to escape your closest scrutiny, for leaks may exist where the most honest exterior appears. Your works' scales may be cheating you or perhaps your jobbers' scales need watching. I have seen a heavy snowstorm show a manager where coke and coal were getting away from him. In connection with this a good fence about the plant is a necessary expense. Careless charging of water gas machines, coal gas retorts and furnaces can account for high costs, but here again consult your handbook or data on gas manufacture. One of the hardest situations is when you know your apparatus is unbalanced, and hasn't enough capacity for cheaper manufacturing costs. When this is the case it is often cheaper to pay interest on enough money to put your plant in good proportion to your sendout than to continually lose by operating the old machinery. But be absolutely sure that you are getting all out of your present installation that the next man can, before you call an expensive doctor.

Next in order is purification, for, as the real gas man tells us, "next to no gas is dirty gas." Most of us have four boxes, arranged so that one can be cut out for change, and have one box always clean at the end of the series, and have this show clean gas at the inlet, not at the outlet. This test means continuous exposure of lead acetate paper to a jet of gas.

Calculate the cubical contents of your boxes (considering but three, if you have four), and if you have 5 cubic feet of oxide per 1,000 per day's run (meaning the time that you are passing gas through the boxes) you should always have clean gas in front of the last box. If you do not, you are at fault in that you do not provide proper material, or do not change the oxide per a regular schedule.

Water is an item which is wholly forgotten by the men about the plant. They use it as we did of old, with no regard for the quarter when we pay the rent. You are fortunate indeed, if you have an independent water supply; but even then men should be taught to be economical, not allowing leaks or waste, for it always costs good money to get that water into the plant.

Machinery.—Here is one of the places where we fail, no matter how particular we are. The manager cannot be around the plant continuously; but some of the machinery is running at least 12 hours daily, and much of it 24 hours, and is it always getting enough oil and care? Some men are glad to hurry away from their plants because they always hear a knock, a squeak, or a rattle, and they say, "Well, as that engine has run for 5 years with little care, I guess it will turn around a few years yet."

We all know the two stages of machinery: When it is in fine condition, and when it is broken down; but we do not know when it is really first ailing. Where there is much machinery it certainly pays to have a man who is handy and careful. For instance, the boilers. We all have either two or more, and a time when the one can be down for examination and repair, having a thorough washing at least once a fortnight or oftener. This washing time must be regular and recorded each time upon the manufacturing record If you are too busy, have some responsible boiler man of your city there, to criticize or repair, as the case may need.

Do not allow inexperienced men to pass upon or repair the boilers. You will then know if the men are using enough compound, or slighting the washing, or the periodic blowing off of the boiler.

Flue scraping is imperative, and $1 put in a good scraper will save many times its price in coal. But, after you buy one, see that they use it, as there seems to be an idea that blowing the flues with steam does all that is necessary. This is a good supplement to scraping, but alone will clog up the back end of the flues. Put the flue scraper through at least twice every 12 hours of full load on the boiler.

I omit many other details, such as leakages of steam, water and draft; very pertinent to the successful operation of the plant. Data and ideas on these can be obtained from handbooks and literature on the subject.

The exterior and interior of your buildings not only give outsiders an idea of your management (who also may be fooled with a little whitewash and paint), but, most important of all, create a feeling among your men that you are careful and painstaking, and they will attempt to do things in a neater manner.

1. Slightly abridged.—Eds.

The manager should study carefully each morning the entir manufacturing data as compared to yesterday, and the same day the month previous. You will then be able to check errors and losses, and then correct them before it is too late, and will not be surprised through your regular monthly report showing you things you did not know before.

Put off nothing until the morrow. The procrastinator is always in trouble and always about a lap behind. Nothing is more sure than death and taxes; and we can add, the necessity of keeping gas on the town, gas of good quality and at an even pressure.

While not exactly concerned with good operation of the plant, it is well to mention that a recording pressure gauge is indispensable; and no manager can afford to be without one. The manager of the small works is paid less and considered less than his brother with the large company, while his duties are of a more general and particular nature. This is probably one of the ironies of fate. Although his problems are at times well nigh his limits, he has the satisfaction of being one of the most important links between the public and the gas industry, which ranks fourth in the great industries of the world.

Discussion.

Mr. Smith—I have had occasion to visit many plants and have this theory to advance: We need more good football players as managers of our small gas works—men who will start with a rush, making a touchdown every day, as the manager of the large plant has to do. If a man gets on the job at 7 A.M., and quits anytime after 8 P.M., keeping after business and the works for a touchdown at every turn, he will not sit in that swivel chair, as Mr. Stillson said, and scratch his head. He will not need a snowstorm to tell him where he is. Make every one on the job a gasmaker, and when they all want to go to the ball game, go make gas yourself. Don't worry about the sleep you lose to keep gas on the town, and you will find it is better to sleep with your boots on than to sit up awake with them on. There are a good many good items in this paper. First, if any of the fraternity heard the Angel Gabriel blowing his horn for him he would be ready to go—even if his boots were not on, for none of us is going to miss a chance like that. Second, the "has worked," as you explain it. The longer hours to the man that will work seems unnecessary, for there is not a gas works in the State that cannot afford to pay a man what he is worth and not overwork him. Third, a gas works that requires an extra man ought to have business enough to employ a couple of fitters, and as fitters have slack time, I cannot see why an extra man should be employed. Fourth: I disagree about cultivating familiarity. If you cannot be a companion, and treat your men as you would like be treated, you are not working men as a good man. If the boss is white the men don't need a spur. Fifth: Materials, waste oil, etc. It is a good idea to measure your oil, but after several tests I simply take Colonel Pratt's word for it, as I always get the gravity, candles and color specified. Mr. Stillson seems to think that any man that wants to work and has a hand-book to consult, is eligible to the title of gas house terrier. This probably accounts for his pessimistic view on the management of a gas works in a small town. Be an optimist; gentlemen, there is no easier class in the world to get at and sign up for gas consumers than those in the small town. All you have to do is to tell him about it, and sign him up; a cinch and a snap. I quit it because I was ashamed to take the salary; but, for a retired life, nothing would suit me better than the management of a dozen small gas plants!

Mr. Keller—I do not think any handbook can tell you how to operate a small plant. In actual practice the conditions differ, and although handbooks are good things, they are not indispensable to a man who has worked in the business, learning it from the bottom up. Such a man, I think, should be capable of running a small works without referring to one very often. All you have to know is how much manufacturing material you are putting in the machine, even to measuring up your tank, as Mr. Smith says, although I think we can well rely on the oil people to give us the right quantity of goods. They will not misrepresent, and the small gas plant can depend on the specifications that the jobbers and manufacturers put up, although the aforesaid are good things to know. One of the best ways to watch results is to make a gas analysis, and you can tell more about your oil in that way than any other, for different oils must be handled differently. Wherefore, I think practice is more beneficial to the average gas man than a library.

Mr. Miller—One statement that Mr. Stillson made I don't like to see go without challenging. He states that 5 cubic feet of purifying material per 1,000 feet would be sufficient for 24 hours.

Mr. Stillson—Five cubic feet per day's run, to modify it a little.

Mr. Miller—It is not the number of cubic feet of purifying material, but rather the area of the box and the speed with which the gas goes through. As soon as you exceed a make of 1 cubic foot for each foot of area per minute, you are getting beyond the economical use of the sponge; below that you are on an economical side.

Mr. Stillson—There seems no defense to offer. Mr. Miller's point is correct; it is a question of time and area. I take the arbitrary figure of 5, which I find is a safe one to go by; but the question of time and area enters into it also. I think Mr. Smith has the best of it, now that he has retired from the management of a small plant; but I still think he is with me. As to handbooks, I believe what an old professor once told me in school. Quite a number of us in the electrical class were great on notes. The Professor got angry one day and said: "Gentlemen, don't be handbook engineers. Get in it in your heads." One of the fellows replied, "Professor, if we put all the stuff you give us in our heads we wouldn't be of any use at all." Much stuff is handed you in lectures that is not exactly useful, wherefore, I believe a library is essential to the manager of a small gas plant.

The President then introduced Mr. T. B. Genay, of Des Moines who read a paper on

REDUCING BOILER FUEL IN A WATER GAS PLANT.

[For the text of the Genay paper, see *ante*, p. 334.]

Discussion.

Mr. Bertke—Mr. Genay has covered the subject thoroughly. I think the inspection of boilers and settings, pumps, etc., and the repairing thereof, are very important. It is also necessary to know whether you are burning the coal efficiently. If you inspect properly, and take care of repairs, analyzing your stack gases, and also have a pyrometer and get your stack temperatures, any man with ordinary ability can get high efficiencies in his furnaces. If you get high carbon dioxide in your stack gases, you know you have proper conditions to burn all of your combustible. Or, you can analyze for carbon monoxide to see if is completely burned; also, for the percentage of oxygen, to see how much excess air is passing through your furnace. If your stack gas temperature is low, it is almost absolute proof that the inside of your boilers is clean; if it is high, it shows that the conditions are such that the heat cannot be absorbed by the water.

Mr. Vincent—I would like to ask Mr. Bertke what type and size of boilers he uses, and what kind of coal; also, what efficiency he gets and what are his stack temperatures.

Mr. Bertke—The last six months we have tried out different kinds of fuel, and have made a great many tests. We have an electric station in connection with our gas works, and have but one battery of 250-horse power water-tube boilers. We are now using a fair grade of Illinois coal, and the day I left home we made a 24-hour evaporation test. With an approximation of our B. T. U.s from the analysis of the coal, I imagine we were running from from 68 to 72 per cent. boiler efficiency on this particular test.

Mr. Warnick—I think Mr. Genay's paper covers the ground thoroughly, and shows the attention that is necessary to get the highest efficiency in converting coal into steam and utilization thereof. I would emphasize particularly, the inspection of traps. We have to inspect our traps at least once a month and keep them repaired, to insure against leakage. They are a great source of waste if not properly handled. In Omaha, when boilers are down for repairs we have a form covering certain questions that the inspector must answer with reference to the mechanical condition of the boiler. We want the boiler to go on, in first-class mechanical condition, so that short circuits and air leaks are eliminated, linings tight, doors fitting snugly, and tubes and drums cleaned inside and out. If the inspector has to answer questions on a form which he has in his hands, he is more likely to thoroughly cover the ground than if he inspects at random. The case of steam leaks is most important. All idle lines should be shut off as close as possible to the boilers, in order to reduce condensation to a minimum. I have found the Orsat apparatus, used in conjunction with flue gas analysis, to be a very valuable instrument in firing. Losses of fuel, due to excess air are enormous, and a saving can be made by giving proper attention to firing with respect to this excess. The steam consumed in various parts of the apparatus should be kept down to a minimum. If your engine and pumps are consuming too much, a paper and pencil should be resorted to, to figure replacement of the units.

Mr. Smith—I would like to ask if any member has had experience in using breeze. In comparison with other fuels, how does it work under the boiler?

Mr. Warnick—That depends largely upon the draft. You cannot burn breeze without sufficient air to get up the temperature of the fire. To burn breeze we find that we must have a steam blower, which is a very expensive installation, costing, for a 250-horse power boiler, about $350. If we can push up the air supply sufficiently to carry a pretty heavy fire bed, and burn the breeze mixed with coal (either Kansas or Iowa), we get practically 12,000 heat units per pound from breeze.

Mr. Vincent—I think it was Mr. Bertke who spoke about the design of furnaces. If you buy a horizontal return tubular boiler, with the so-called standard setting, for use in this part of the country, and expect to use it with soft coal, it will not give the best results. Apparently the boiler makers are not awake to the fact that there is any such thing as bituminous coal, although many of the boilers are manufactured where such is the principal fuel. They set their boilers about 2 feet above the grates, when they should be 4 feet. It will pay you, if contemplating installing a new boiler, to specify that it be set 4 feet above the grate, if you expect to use soft coal. Many text books, and some of the earlier government bulletins, in instructing how to fire soft coals, particularly of low grade, are in error. If you attempt to fire Iowa coal in an ordinary furnace, as they direct, you will not get the full capacity of your boiler, nor will the efficiencies be increased. Our experience indicates that these low-grade soft coals should be fired heavily, instead of being spread thinly, a small portion at a time, or piled in front and coked. The loss from heavy smoke will not be as great as the loss due to the frequent opening of the doors, required by the light-firing methods. This may not apply to rich Eastern bituminous coals, and the difficulty seems to be in failing to distinguish between high and low grade coals. I believe, too, that these firing methods were developed not to increase the efficiency as much as to eliminate smoke. They will fail in this also, if tried with low grade fuels.

Mr. Genay—The subject has been very well covered, but there is one point I want to bring out. I think the paper sounded as if it only applied to the larger plants; but that is not so. It applies to every plant—that is, some part of it does, and particularly the finding how much steam your units are using. I find that small plant operators often buy units because of cheapness in first cost. I think, though, if they figured their steam consumption, and spend just a little bit more in arranging some of their labor conditions; they will find they can get some of these economies which they seem to feel now belong only to the larger plants. They are within reach of the small plants, without any great outlay of money or any more superintendence, or even any more labor.

On motion, a vote of thanks was given Mr. Genay for his paper.

The President introduced Mr. J. H. Warnick (Chairman), who handed in the following

REPORT FROM STANDING COMMITTEE ON CONSTRUCTION.

Coal Gas.—The advancing price of oil has awakened a keen interest in the development of coal gas manufacture. We hear of the "Latest Developed Koppers Ovens," the "New Chamber Ovens," "Improved By-Product Ovens (both inclined and horizontal types)," and also, "Vertical Retorts." All these should be considered, if figuring on installing a coal gas plant. The tendency at this time is to carbonize coal in larger quantities and at higher temperatures than formerly. Silica linings have aided greatly in facilitating carbonization at higher temperatures, and thus labor cost has decreased. To make a comparison of these various types of combustion would require too lengthy a report, and would not accomplish enough good to warrant the labor. We have reason to believe that none of these types has reached its highest degree of perfection, and anyone considering the problem of coal gas installation should employ the best and most efficient advice before deciding. For those who desire to read on the subject, we suggest the following papers, which give a general view covering the development of coal gas ovens during the past year:

"Gas Ovens in Europe and America," by Mr. G. F. Goodnow, and the discussion thereon.

"Description of Modern Vertical Retorts," by Mr. A. J. Wilbur, and discussion.

"Guide Framing Calculations for Holder Construction," by Mr. E. F. Miller.

"Building a Plant in 78 Days," by Mr. W. E. Barrett.

Water Gas.—The tendency in water gas operation is towards high pressure blast of short duration, giving increased capacities. Air and steam meters, and pyrometers are being more generally used, and scientific principles are applied to the utilization of fuel and oil. There has been no marked development from the construction standpoint, except the waste heat boiler, which is becoming more generally recognized as a necessary part of the equipment in water gas installations. The gas engineer is making more of a study of his mechanical apparatus than formerly, and is realizing that high efficiencies and economies can only be secured by keeping his power plant in a good state of repair. This has led to more scientific principles of operation, in boiler plants, and study of steam consumption; but there has been no new development along lines of construction in power plants and accessories.

Wrinkles.—The Committee thought this would be a good opportunity to submit some wrinkles of a constructive nature, that have been worked out by men in charge of the plants represented here. We accordingly offer the following:

Device in Use at Sioux Falls, to Prevent Blast Main Explosions.—A flopper, with a large ball weight holding it tight against the blast-tee to the generator, is connected by a rope and pulley overhead, to the stem of the generator blast valve, so that when the run is on, and the generator valve seated, the flopper is partly open, purging the blast main during the run of any gases that might enter through a leaky blast valve. It closes tight when the blast valve is opened, and is held in place by the weight. Of course, the blower has to run slowly during the run, when putting this scheme into effect.

Device for Purging Blast Line of Gas Due to Leaky Valves.—In the Omaha plant a 3-inch line is connected to the blast main, just behind the generator blast valve and the carbureter blast valve, running up through the operating floor beside the superheater. At the top of this purging line is a quick opening valve, connected to the stack valve lever, in such a way that it is open during the run and closed during the blast. Therefore, as the blower runs slowly during the run, the blast connections are purged of any gases that might get into them. A 3-inch purging line is used on 11-foot sets, but on a 6 or 8-foot set, a 1½ inch would be large enough.

Device for Feeding Soda Ash to the Boilers.—We experienced considerable trouble at Omaha, feeding concentrated solution of soda ash to the boilers with a pump, due to the solution eating out the pump valves. We accordingly erected a 200-gallon tank, operating on a fixed head and discharging into a condenser, used as a mixing tank for the boiler feed water. In the discharge line we placed a disc with a fixed orifice of sufficient size to discharge a full tank of soda ash solution, once in 24 hours. The required amount of soda ash, to neutralize the quantity of water used in 24 hours, is mixed and fed proportionately to the use of the water. The disc is in a flanged union, so that it can be readily removed and cleaned.

Overhead Fuel Runway at Omaha.—A fuel runway, of light steel construction, is hung on the side of two buildings and carried from the generator house floor to the unloading track. As it is necessary to wheel the fuel to the charging floor, and wheel boiler fuel from the bin to the boiler room, the wheelers also assisting the gasmaker in charging the 11-foot sets. We could utilize these men to unload generator fuel directly from the box cars at the end of the runway, and save the cost of handling generator fuel in to the yard. In addition, we have saved breeze enough to amount to about ¼ pound per 1,000 made, due to not rehandling the generator fuel.

On motion, the report was adopted, and a recess (to 2 P.M.) was ordered.

(To be Continued.)

The Advantage Gained in Operating a Water Gas Machine by the Use of the Pyrometer.

[A paper read by MR. F. L. WEISSNER, before the Gas Session, Southwestern Electrical and Gas Association.]

Gas manufacture has been discussed more than almost any other division of the gas industry, because of the possibilities of reducing the cost of our product; also, because of the improvements and developments constantly appearing therein. Without going into details of gas manufacture, my purpose is to call attention to the advantages gained in operating a water gas machine by the use of a pyrometer. The electric pyrometer (not, of course, in its present stage of perfection) has been in use for many years. In 1821, while making experiments on the difference of potential that appears to ex-

ist between different metals when in contact, Seebeck noted, that if a circuit is formed, composed of two wires of different metals joined together at their ends, and if the junctions are at different temperatures, a current will in general be produced in the circuit. Thus, if two copper wires, which are connected to the terminals of a galvanometer, are connected at their ends to a piece of iron wire, and one of the junctions is heated, current will be indicated by the deflection of the instrument. This is known as an thermo-electric current. The pyrometer, in its present stage of development, consists of a thermo-couple connected, by means of two copper leads, to an instrument showing a deflection of the needle on a scale, in proportion to the magnitude of the difference in potential set up at the junction of the thermo-couple, due to the temperature to which it is exposed. The indicating instrument is really nothing but a very sensitive millivolt meter the scale of which is calibrated to read directly in temperature degrees. Each instrument must be calibrated with its own leads, because the slightest variation in resistance tends to introduce a considerable error in the indication of the instrument.

In order to properly equip a gas machine, two thermo-couples should be installed, one about 2 feet from the bottom of the carbureter, and one in the superheater, in approximately the same position, each of the thermo couples being connected to the indicator. A recorder, which is best installed away from the generator house, where there is no vibration, is connected so that it can be made to record the temperature in either the carbureter or the superheater.

Various methods are followed to determine a schedule by which the best results can be produced. Our whole process depends almost entirely upon what takes place in the generator. Air is supplied to the fuel in sufficient volume to raise it to the proper temperature, and, at the same time, have just sufficient combustible gases carried over into the carbureter and superheater, to be completely consumed by uniting with the additional oxygen supplied after the gases have passed from the generator. It is obvious that, if any of these combustible gases are allowed to escape through the stack, the consumption of fuel in the generator will be greater than necessary. It is estimated that a CO content of 3 per cent. in the stack gases will involve a fuel loss of about a pound for each 1,000 cubic feet of gas made. If, on the other hand, the combustible gases supplied to the carbureter and superheater are less than could be burned with the volume of air supplied, the time required to bring the apparatus up to the proper temperature will be greater than it should be, with the result that the generator will become too hot and a waste of fuel will again result. The blowing period is continued until the fuel bed is in a proper state of incandescence, and the temperature of the carbu reter and superheater is sufficient for the complete gasification of the oil and fixing the mixed gas to render it permanent, without breaking up of the hydrocarbons and forming free hydrogen and lampblack. The object of the blow is to store up as much heat as possible in the fuel bed, to be drawn upon during the process of disassociation of the steam, and to generate just as much carbon monoxide as can be burnt in the carbureter and superheater, to bring the temperature to the desired point with the sensible heat carried over by the blast gases. The formation of carbon monoxide in a bed of incandescent carbon does not occur freely until a temperature of 1,800° F. has been reached; and, since it is desired to produce a maximum amount of this constituent, by the disassociation of a given amount of steam, with a minimum amount of carbon dioxide, the importance of maintaining a temperature at which such a reaction can take place is evident. The determination of the temperature at which the best results can be obtained, is simply a matter of experiment, the method employed being to analyze the gas by means of an Orsat apparatus, with which every gas manufacturer of the present day is familiar. The principal thing to be investigated being the quality of producer gas generated, samples for analysis, should be taken at the top of the carbureter, or as close to the generator outlet as possible, at the inlet to the superheater, and at the stack valve, noting also the blast pressure under the grates of the generator, the length of the blow, and the character of clinker. In connection with the run, it is, of course, necessary to investigate the quality of the made gas, and samples should be taken at the wash box, and during various parts of the run, say during the first, third and fifth minute, in order to ascertain the length of the run best suited for the amount of steam used and the make per run. A certain temperature is arbitrarily chosen. which is to be kept uniform throughout the experiment conducted as outlined above. It is to be noted, in this connection, that the temperature in the superheater should be from 50° to 100° less than in the carbureter, because the gasification of the oil (an endo-thermal or heat absorbing reaction) takes place almost completely in the carbureter. These conditions having once been established, the electric pyrometer makes it easily possible to continue following the schedule. Without a pyrometer, the only method of judging the temperature is by noting the color of the checkerbrick through the sight cock and the time of the blow is gauged entirely by the clock. It is true that good results have been obtained by regularly blowing a certain number of minutes. It does not follow, however, that an equal amount of heat is stored up in the generator each time, upon which to draw during the succeeding run, or, in other words, that uniform conditions are secured. A 4-minute blow in one instance may raise the temperature of the carbureter to 1,400° F., whereas in another instance during the same length of blow, the temperature may rise to 1,600* F. This is demonstrated by charts taken from the carbureter, operating under a straight 4-minute blow (except the first blow after coking, which was 5 minutes) and a 5-minute run. Each peak represents the maximum temperature in the carbureter during the run, and it is to be noted that the temperature ranges all the way from 1,225° F. to 1,600° F., or anything but uniform. In this particular instance, the machine was operating from 6:30 o'clock A.M. to 3 A.M., being clinkered twice. The following results were obtained:

Generator fuel per 1,000	28.4 pounds.
Enricher per 1,000	3.47 gallons.
B.T.U. per cubic foot	602
Kind of fuel used	coke.
Blast pressure under grates	18 inches.
Length of blow	4 minutes.
Length of run	5 minutes.

When operated according to temperature, with a 5-minute run, the maximum temperature being kept as near as possible constant at about 1,450° F., the following results were obtained:

Generator fuel per 1,000	26.4 pounds.
Enricher per 1,000	3.50 gallons.
B.T.U. per cubic foot	615
Kind of fuel	coke.
Blast pressure under grates	18 inches.
Average temperature of carbureter at beginning of run	1,400° F.
Length of run	5 minutes.

In order to keep sonditions uniform the pyrometer must be watched closely during both the blow and the run; and, after some practice, it is possible for the gasmaker to accomplish wonderful results. No special rule can be given by which to operate, because of the rise in temperature after the blast has been cut off and the run has been put on. At the beginning of the blow the temperature rises very slowly, due to the fact that the fuel in the generator has been cooled off to such an extent, that conditions are unfavorable for the formation of carbon monoxide, and consequently no heat is given off except the sensible heat of the blast gases. After the first minute or so, the quantity of carbon monoxide increases, causing the temperature to rise quite rapidly toward the end of the blow. In this connection it may be well to call attention to the importance of opening the carbureter blast valve gradually as the temperature rises, admitting a small amount of air at the beginning of the blow, and gradually increasing it, in order to obtain complete combustion of all the carbon monoxide given off toward the end of the blow; also, to avoid objectionable cooling in the carbureter, by admitting an excessive volume of air at the beginning of the blow. When a temperature of about 1,400° F. is reached (about 1,420° for the down run) and the blast is shut off, the temperature in the carbureter will rise about 50° during the first minute of an up run, but not quite so much at the beginning of a down run. Then it will decrease, slowly at first and quite rapidly toward the end. If this rise in temperature is less than 50° it shows that the fuel bed was not hot enough; and if the steam is not reduced, the temperature will fall below the minimum value, with the result that an excessive amount of carbon dioxide is formed. If the rise in temperature is greater, it shows that the fuel bed was hotter than necessary, and the minimum temperature will not be reached at the end of the run, the uniformity of conditions being thus destroyed. A decided advantage is gained by the use of an electric pyrometer, inasmuch as excessive cooling of the fuel bed can be avoided, which is likely to happen when the fire has been burned down toward the end of a coking, or when the effects of clinker begin to show. Knowing that the temperature should not drop below a certain value, the gasmaker can readily see an excessive drop as the run progresses, and reduce the quantity of steam; thus it is pos-

sible to secure uniform conditions, even though the fuel bed be low. This shows on the chart when the fire is burned down at the end of the day's make, the quantity of both steam and enricher being gradually reduced. This, of course, results in a decided decrease in the make, but the method will prove economical.

It frequently happens that gasmakers, when operating according to a fixed schedule, record the time of blows, runs and oil meter registrations, as much as 10 to 12 ahead of the one in progress. While there is really no objection to such practice, as regards the registration of the oil meter, the fact that the machine has been blown up to the desired temperature in a certain length of time, is no guarantee that the time required to reach that temperature will be the same on the next blow. As I have pointed out that the operation of a water gas apparatus is strictly a matter of combustion and storing up heat for the production of the water gas in the fuel bed, with the gasification of the oil in the carbureter; consequently the temperature is the all important factor involved, and not the time that has elapsed during a blow. The electric pyrometer is an advantage, not only in securing better results, by maintaining constant and uniform operating conditions, but the checkerbrick will last longer, as a result of not being heated to temperatures higher than necessary. It indicates changes in the carbureter and superheater, through uneven fluctuations; which show that the free passage of the gas through the checkerbrick is obstructed, reducing the heated surface with which the gas comes in contact, and the oil results will invariably be poor. Napthaline troubles will also be greatly reduced. The high cost of oil will undoubtedly bring about some changes in the art of water gas manufacture. It will result in the application of more scientific methods for the purpose of eliminating waste and improving returns, and we must adopt some means by which the gas maker can tell, without waiting until to-morrow, whether or not his results are satisfactory. Instruments, such as steam-flow meters, air meters, recording CO_2 apparatus, and recording calorimeters, will be more generally used and simplify, to a great extent, the problems involved, and help the operator to greater success.

The following analyses show the varying composition of water gas made at different periods of a run:

ANALYSIS OF WATER GAS.—*Samples Taken During First, Third and Fifth Minute of the Run:*

Kind of fuel.....Empire coke.
Kind of enricher.....Chaison crude oil.
Length of run.....Five minutes.
Length of blast.....Three minutes.

	First Minute. Per Cent.	Third Minute. Per Cent.	Fifth Minute. Per Cent.
CO	3.5	3.5	7.4
C_6H_6	0.8	1.1	..
C_2H_4	8.3	11.3	0.4
O	0.6	0.5	0.2
CO	32.6	27.7	31.6
CH_4	14.5	19.6	3.4
H	29.6	31.3	46.0
N	12.1	5.0	11.0
B.T.U	539.0	626.0	301.0

The following is an average sample from the holder:

Component.	Per Cent.
CO	4.6
Ill	12.1
O	0.7
CO	30.1
CH_4	12.8
H	31.4
N	8.3
British thermal units per cubic foot	617

Illinois Public Utilities Commission.

A bill has just been passed by the Illinois Legislature, and now awaits the action of Governor Dunne, creating a State public utilities commission. The five commissioners are to be appointed by the Governor, not more than three to be of the same political party; the term of office will be six years, the appointments being so timed that not more than two will expire in any year. The Governor will designate the chairman; the commission appointing its secretary, attorney, accountants, engineers and other employees. Each commissioner is to receive a salary of $10,000, the secretary $5,000, and the attorney $6,000.

The commission will have general supervision of all public utilities. It shall examine franchises, capitalization, rates and other charges and also the service rendered.

Public utilities owned or operated by municipalities are excluded from the control of the commission; but all others are directed to furnish the commission all required information, to deliver required documents, accounts and records and to obey the orders of the commission. Public utilities are defined as individuals, firms, corporations or associations that own, control, operate, or manage for public use "any plant, equipment or property used or to be used for or in connection with the transportation of persons or property, or the transmission of telegraph or telephone messages between points within this State; or for the production, storage, transmission, sale, delivery or furnishing of heat, cold, light, power, electricity or water; or for the conveyance of oil or gas by pipe line; or for the storage or warehousing of goods; or for the conduct of the business of a wharfinger."

Power is given to the commission to establish a uniform system of accounts, and to prescribe the manner in which accounts shall be kept, the system of accounts established, not to conflict with those of the Interstate Commerce Commission. Such accounts shall distinguish clearly between payments for operating expenses, and those for new construction. Utilities may be required to keep such accounts as will "adequately reflect depreciation, obsolescence and the progress of the arts," and the commission may fix the rate of depreciation. Annual reports to the commission must be made by the utilities. Monthly reports of earnings and expenses must be given if asked, and special reports where demanded. All reports to be under oath.

The issue of stocks, stock certificates, bonds, notes and other evidences of indebtedness must be authorized by the commission. Securities sanctioned by the commission shall be identified as such. The bill provides for a rigid investigation by the commission, when application is made for authority to issue stocks or bonds. If necessary, an adequate physical valuation may be made, and proceeds of the sale of securities must be applied as required in the commission's order. Notes running not longer than twelve months may be issued without the consent of the commission, but cannot be converted into stocks and bonds, or renewed for a longer period than two years, without consent. In mergers the commission may not approve a capitalization exceeding the sum of the capital stock of the consolidated corporations at par, plus any additional cash actually paid for improvements. Severe penalties are provided for the issuing of securities contrary to the provisions of the act, and it is not to be construed as validation or approval of past issues of securities.

Consent of the commission is necessary for the merger or joint operation of two or more utilities, and for the sale or lease of one to another. Where merger is contemplated, the companies must file a petition setting forth all the circumstances, and the commission decides, attaching such conditions as it deems necessary.

No franchise will be granted to any public utility, except common carriers engaged in interstate commerce, other than a corporation incorporated under the laws of Illinois, and no public utility shall be exempt from the provisions of the act by reason of the fact that it is incorporated under the laws of another State.

The commission is to have power to ascertain the value of the property of every public utility in the State and every fact which in its judgment may have a bearing on such value, and may make revaluation from time to time.

All rates must be just and reasonable. Schedules showing rates, charges, and classifications, must be filed with the commission and open to public inspection. Without the consent of the commission these rates must not exceed those in effect on July 1, 1913. The commission has, however, power to fix rates in excess of those of the date mentioned or below them. Contracts between public utilities must be filed with the commission. No utility shall increase any rate without a finding by the commission that such increase is justified. Provision is made for a hearing on the propriety of any rate, either on complaint, or on the initiative of the commission. Neither more nor less than the schedule rate shall be charged, nor shall there be any refunds or rebates, and differences in rates as to localities or classes of service must be reasonable. Specific provision must be made for the fixing of rates by the commission, where it is found that existing rates are unjust.

The commission shall prescribe rules for the performance of any service of any public utility. Additions, repairs, or improvement to plant and equipment, may be ordered. It may test meters and appliances, and establish standards of accuracy, and any consumer may have his meter tested upon payment of the fees fixed by the

(*Continued on page* 10.)

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NEW YORK, MONDAY, JULY 7, 1913.

[Special Correspondence, London, England.]

JUBILEE MEETING, INSTITUTION OF GAS ENGINEERS.—SECOND LETTER.

[Communicated by ARTHUR H. ELLIOTT, Ph.D., Consulting Engineer-Chemist, New York Consolidated Gas Company.]

LONDON, ENGLAND, June 18th, 1913.

The meeting of the Institution this morning was an example of an abundance of papers and a famine of time. The first business was the report on the Benevolent Fund. Here the President gave some good advice to the members. The fund was short of money and many of the members had given generously, but what he thought was most necessary was that all the members should give something, no matter how small. It seems that this has not been the habit in the past; but, from the way the remarks were taken, the future will show an improvement in this direction. The veteran, Dr. Thos. Newbigging, contributed 50 pounds to the Fund as a thank offering for the kindness of the Institution to him in the portrait they presented to him.

The report of the "Refractories Committee" brought out some good discussion, to which Mr. Robert M. Searle, of Rochester, N. Y., contributed much valuable information, telling of the work in America with silica retorts and settings. Herr Körting also spoke along the same line, telling of what he saw on his last visit to the United States, and the undoubted success of silica brick in retorts settings, and also in coke oven plants. From the general drift of the discussion it would appear that the Refractories Committee's specification had not given entire satisfaction; but its usefulness was well apparent, and showed that the Institution was doing good work along this line, as well as in the way of papers read at its meetings. The Institution has inaugurated a system of abstracts of the papers, which are read at the meetings. This seems an admirable arrangement and works well, leaving much more time for discussion. The paper on "Coke Oven Carbonization," was read by Mr. W. Chaney, of Birmingham, where they have a municipal plant and work under a City Commission on gas. The paper appeared to emphasize the production of metallurgical coke. This is due to the fact that Birmingham is a good market for this fuel. The Mond producers are used for firing the ovens, and all the gas from the ovens is used for the town. This gives a high yield of ammonia and cuts the costs of carbonization. The fuel used (mixed coal and coke) is about 15 per cent. of the coal carbonized, but the high yield of ammonia sulphate (about 90 pounds) brings the cost well below other methods. The amount of capital necessary is about £170 to £180 per ton of coal carbonized, which equals, on an average, $875. This is considered excessive compared with retort carbonization; but the life of the chamber ovens which they use is between 7 and 8 years, 250 days each working year. Much, of course, depends upon the character of the coal used as to the kind of coke produced, and Mr. Herring (formerly of Edinburgh) suggested that different coals needed separate ovens. Several types of ovens might be used if a variety of kinds of coke were called for, and the city large enough to warrant the cost of installation. He remarked that the anthracite nut coal now was preferred here, and brought a higher price than gas coke. Herr Körting remarked that he could not see the use of making so much trouble to obtain coke. He said that his business was to make gas, and that at the present state of the art, vertical retorts would give, from the same coal as used in ovens, 13 per cent. more gas and with less fuel to carbonize, Verticals also give more ammonia than retort settings. Mr. Thomas Glover, of Norwich, called attention to another fact that, having made a market for your coke, you could not change the coal used or you will find that the customers would complain. They get used to certain kinds of coke in industrial works and a change upsets their usual manner of working. As a matter of fact from the discussion (a most interesting one, in which 14 members participated) the coke oven proposition is decidedly debatable. The gas produced by the ovens gave 500 B.T.U. and a yield of 12,500 cubic feet per ton. A paper on "Liquid Purification," by Dr. W. B. Davidson, also of the Birmingham Commission, was read in abstract by the author. This was criticised by a number of members, but nothing definite came from the criticism on the paper. It appears that the matter is in a state of experiment, and the author had only made suggestions of what he is aiming at. Mr. Allen, of Liverpool, suggested that the use of hot tar gave naphthaline stoppages in the mains. He also questioned the high figures given (7½ pounds) for the recovery of the cyanogen. For naphthaline he had used the Simplex washer and Russian vaporizing oil, a distillate from Russian petroleum. Mr. Drury compared verticals with horizontals in regard to tar separation, and said that when he uses horizontal retorts he has to employ a naphthaline solvent; but with the vertical retorts there was no need for such solvent. He also remarked that the sulphur from carbon disulphide was only 20 grains per 100 cubic feet in the use of vertical retorts. The ammonia also is 10 per cent. greater in the vertical than in the horizontal retorts. In reply Dr. Davidson stated that temperature of retorts was 2,000° F., and that the tar from verticals was more difficult to handle than from horizontals. He also stated that the spent oxide contained 60 per cent. of sulphur. The amount of fixed ammonia in the liquor depended upon the coal used. If oil deposited in the holder he found more naphthaline in the outlet pipe than in the inlet. The paper on "Gaseous Heating," by Mr. E. W. Smith and Mr. C. M. Walter, was read and the discussion set over for to-morrow. To-night is the Annual Dinner of the Institution at Connaught Rooms, Great Queen street.

LONDON, June 19th.

The annual dinner of the Institution of Gas Engineers was held last night at Connaught Rooms, Great Queen street, and was an unqualified success. No other such gathering of gas engineers and notable men in the science and art of gas manufacture ever assembled in this great city. It was a remarkably well-arranged affair, a feast of music and fine speeches, together with a goodly repast, filling 3 hours of time that passed only too quickly for those present. Amongst the sharers to the right and left of President Sir Corbet Woodall, and who spoke, were: Sir Alfred Keogh, K.C.B., of the Imperial College of Science and Technology, South Kensington, who made an admirable speech on the union of science and industry. Dr. Marston T. Bogert, President of the Society of Chemical Industry, was coupled in the same toast. Here we had a good example of Columbia University science paired with the British savant, and the reception given to the wit and humor of the New York Professor, with its apt applications, was received with rounds of applause. The toast of "The Institution of Gas Engineers" was responded to by Sir Corbet Woodall, emphasizing the propriety of uniting the various Societies, "The Society of British Gas Industries" and "The British Commercial Gas Association," each of which happens to now own him as President. His ideas were loudly applauded. "Kindred Societies" was responded to by Mr. Edward Allen, of Liverpool, and R. Elliott-Cooper, of the Institution of Civil Engineers. "Our Brethren from Over the Sea" called for speeches from Mr. William King, who introduced M. R. Ellisen, of the French Society of Gas Engineers; M. P. Bolsius, President of the Dutch Association of Gas Engineers; and Dr. Arthur H. Elliott, who responded for the American Gas Institute. They were all warmly received and their remarks greeted with applause. "The Society of British Gas Industries" was responded to by the President of the Society, Prof. Harold B. Dixon, who was introduced by Mr. John Young, of Hull. Bailie Thomas Paxton responded for "The British Commercial Gas Association." As Chairman of the Gas Committee of the City of Glasgow, he made some pertinent and telling remarks about those companies that had failed to join the Association, but that were reaping the benefits of the work being done and published by it, without contributing a penny to its support. He said over 68 per cent. of the British companies now belong to it, and he hoped to see them all join. "The

Visitors' " toast was given by Mr. Alexander Wilson, of Glasgow, in his usual hearty and good-natured manner. It was responded to by Mr. E. H. Lloyd, K.C., and Mr. C. V. Boys, of calorimeter fame, who took occasion to plead for the Standard of Gross British Thermal Units in the sale of gas. Altogether, the dinner was a great success. Among those supporting Sir Corbet Woodall we also note: A. G. Vernon Harcourt, whose lamp is the English photometric standard; Prof. Arthur Smithell, F.R.S.; W. D. Helps, of Council of British Gas Industries; Prof. Silvanus Thompson, President of the Illuminating Engineering Society; Mr. W. A. Aldrich, of the American Gas Institute; Herr Ernest Körting, of vertical retort fame; Sir Frederick Donaldson, K.C.B., President of the Institution of Mechanical Engineers; Arthur Cooper, L.L.D., President of the Iron and Steel Institute; the veteran, Thos. Newbigging, D.Sc.; Mr. E. L. Rieha, of the American Gas Institute; Mr. L. Santu, of the Dutch Association of Gas Engineers, and of the island of Java; A. T. P. Hayman, of the Belgian Association; also, our own Robert M. Searle and his aide, Mr. H. Russell, of Rochester. In all about 300 representative men of the gas industry. The programme was very handsomely finished, with the portraits of Thomas Hawksley and Sir Corbet Woodall, the first and last Presidents of the Institution.

June 19.

The morning session was well attended. The paper of Messrs. E. W. Smith and C. M. Walter was the first order of the day, which opened with discussion. Mr. Brearley characterized it as a sound and practical paper, and along the lines to be pursued with this subject. He took exception to the preheated air in burners, and said that cold air gave better results, at least in primary air in the moisture; secondary air might be another matter. He also took exception to the formulae in the paper. He said manufacturers did not find these would fit into practical work. He regretted that more work had not been done on surface combustion. The rest of the discussion was in the nature of questions; but the paper did not bring out anything definitely new or interesting. In fact, it was in the nature of a preliminary report. Sir Corbet Woodall, in closing the discussion, remarked, it was a happy omen that the manufacturers were even studying the formulae; he hoped for better progress from just such union of ideas, a harmony of formulae and practice.

The paper of Mr. Goodenough, of The Gas Light and Coke Company, was an admirable one, and brought out some very good discussion. In the latter it was evident that gas engineers were very much dissatisfied with the growth of young men in the industry, and the lack of means of educating along lines that would make them most useful to themselves and their employers. The organization inaugurated by The Gas Light and Coke Company, in conjunction with the London County Council Schools, is due to Sir Corbet Woodall, and it is working out very satisfactorily. It is a combination of school work and practice simultaneously, and the payment of the boys at the same time. In the business part of the instruction, Mr. Goodenough suggested the teaching of a kind of business psychology by which a boy was taught to know his job, know himself, and know the customer. Some of the members thought it was easy for a large company to carry out this plan, but questioned its utility for small works. To this Mr. Goodenough suggested the formation of centers of instruction where several companies could combine in some scheme for the practical education of young men for the gas business. Through all the discussion it was evident that the members are not hopeful of getting anything out of the present school system without special efforts on their part. This conclusion is entirely in line with our experience in America, where we have inaugurated similar helps for the men. Germany has supplied this demand in all industries by her admirable system of evening training schools. "Notes on Suburban Gas Supply," by Mr. Johnston, of Brentford, was the last read, and the papers by Dr. A. C. Humphreys on "Depreciation," and Mr. Langland's on "Ventilation and Gas," were not read from lack of time, but were ordered printed. To morrow comes the garden party at Sir Corbet Woodall's country place, at Chislehurst, in Kent, and everything points to a most successful and happy ending of the Jubilee Meeting of the Institution of Gas Engineers.

BRIEFLY TOLD.

Sir Corbet Woodall's Address.—The address of Sir Corbet Woodall, at the meeting of the Institution of Gas Engineers, was just such as would be expected from the acknowledged head of the English gas profession, and a man of his liberal views upon industrial problems. He gave an outline of the 50 years' progress of the industry, with an added personal touch of reminiscence, that largely increased its interest. He dwelt particularly on the real goal of the operator as laid down an hundred years ago by Samuel Clegg, who demonstrated what some of us have to learn over and over again, through costly experiment, "That a high yield of gas is the most profitable aim of the gas manager." He sees in the future our industry, working along this same line, a mighty force for the conservation of the natural resources stored up in world-wide coal deposits.

June Meeting, Philadelphia Section, National Commercial Gas Association.—The June meeting of the Philadelphia Section, National Commercial Gas Association, was held in the Auditorium of the Y. M. C. A. Building, 1421 Arch street, Thursday evening, June 26th, with Mr. Thomas R. Elcock, presiding. After the regular business session, wherein it was announced that the July meeting would consist of a moonlight excursion on the Delaware river, a letter of complaint was read by Mr. Elcock, presumably written by a dissatisfied consumer, but in reality composed by several members of the Programme Committee. This hypothetical communication criticised each and every department of the Compa ny in the methods of handling a certain lighting order recently taken by one of the salesmen. The consumer was desirous of knowing why he should not have received more efficient service. A representative from each department was appointed to reply to these charges, to show why it was necessary to adopt certain procedures to obtain the greatest efficiency. The accusations, purposely exagerated, were so numerous that, in order to reply to them, it necessitated the enumeration in sequence of each and every step required to complete the work. At the termination of each dissertation by respective representatives, the question was thrown open for general discussion. The programme was voted a success as it was a decided innovation and afforded the opportunity for each and every member of the Section to obtain some valuable information relative to the operation of other departments than their own. Before adjournment, it was voted to suspend the regular meeting nights during the months of July and August.—M. G. Neff.

CURRENT MENTION.—

Mr. E. R. Jordan, formerly Assistant General Superintendent of Mains, Consolidated Gas Company, New York, has been appointed General Superintendent of that division of the Company's work, succeeding the late Mr. C. C. Simpson; and the latter's son (Mr. C. C. Simpson, Jr.) succeeds Mr. Jordan as Assistant General Superintendent.

The MacArthur Concrete Pile and Foundation Company, 11 Pine street, N. Y. city, have been awarded these contracts: About 600 pedestal concrete piles, to be built in connection with the foundation for the new 2,000,000 cubic foot capacity holder, to be erected by the Bartlett-Hayward Company for the Mohawk Gas Company, of Schenectady, N. Y. Also, the contract for the foundation (complete) for the new retort house structure for the Hartford City (Conn.) Gas Light Company.

At the annual election of the Cleveland (O.) Section of "The Gas Meeters" these officers were elected:

Commissioners—F. R. Hutchinson (Chairman), C. D. Halford and C. Riordan.

Secretary-Treasurer—William Holtz.

The organization is in a very flourishing condition, and, while no definite announcement has yet been made, it is expected that "The Meeters" will soon hold a picnic. It is proposed this fall and winter to have a series of dinners, dances, bowling matches, etc.

The Gas Machinery Company, of Cleveland, O., will erect the new water gas apparatus that has been ordered for the use of the Charles City (Ia.) Gas Company. The Gas Machinery Company built the Charles City plant under contract some years ago, and the new apparatus is to be a duplicate of that originally installed.

The balance sheet issued by the United Light and Railways, showing the operations of the Company for the 11 months ended May 31st, 1913, discloses net earnings amounting to $2,177,589.08, as against $1,867,553.57 for the corresponding period in 1912. This is a percentage increase of 12.8; the increase in operating expenses, meanwhile was 10.2 per cent., as against 12.8 per cent. in 1912.

Mr. Frederick W. James, of Bridgeburg, Ont., has been appointed Superintendent of the Union Natural Gas Company, with headquarters in Chatham, Ontario.

The Cooperstown (N. Y.) Gas Company's proprietors have given final notice that the plant will be closed next Thursday. The proprietors say the plant does not pay; the residents assert that the owners will not expend sufficient money to put it in paying condition, preferring to oblige all the residents to patronize the electric lighting plant that is also operated by the owners of the gas works.

The Town Board of Brookhaven, Long Island, have authorized the Patchogue Gas Company to extend its main system to and through the first named place.

Messrs. Humphreys & Miller, the expert engineering accountants, recently engaged in the task of valuing the properties of the Washington (D. C.) Gas Company, have returned the appraisal figures at $18,700,000.

Now comes the end, the Butler (N. J.) Borough Council having received notice from Attorney Palmer that the Butler Gas Lighting and Heating Company will cease furnishing light for the named borough on the 15th inst., unless meanwhile the plant is purchased by someone who will keep it going. Shades of Loomis; also of Pettibone.

(Continued from page 7.)

commission. Commissioners and their agents may enter upon the premises of any public utility for the purpose of examination and tests.

No utility shall begin the construction of any new plant which is not in substitution of an existing plant, or an extension thereof, without a certificate of public convenience and necessity from the commission, and no new utility shall transact business without obtaining such a certificate.

Reports of all accidents must be filed with the commission. If the accident causes loss of life or limb, the utility must give notice of the fact immediately, using the speediest means of communication. The commission may investigate accidents, but neither the report from the utility, nor the findings of the commission shall be admitted in evidence in any damage suit.

All hearings must be in public. Commissioners may issue subpoenas, compel the attendance of witnesses and administer oaths. No subpoenaed witness, testifying under oath, shall be subject to any penalty for anything he may divulge. The commissioners and their duly accredited agents have the right, at any and all times, to inspect the papers, books, plant and equipment of any utility. Utilities themselves can make complaints as well as citizens, societies, municipal corporations or others. Appeal from the decision of the commission may be taken to the Circuit Court of Sangamon County. From the Circuit Court the case may be appealed to the Supreme Court. The methods of enforcing the act are carefully set forth in several sections.

By the terms of the act, the Illinois Railroad and Warehouse Commission, established in 1871, is abolished, its rights, powers, and duties being transferred to the State Public Utilities Commission.

If the Governor does not veto the bill, the act will take effect on Jan. 1, 1914.

Selling Domestic Appliances.

[A paper read by Mr. G. M. Howsmon, before the Southern Gas Association.]

The Method to Pursue, and When to Direct a Special Effort.—In making such broad subdivisions of my subject I am fully aware of having opened an inexhaustible mine, yet they are exactly the points that I wish to lay before you. I will, therefore, prune them down to my own special purpose. In "Methods to Pursue," I mean to consider the advisability of straight, consistent canvassing as compared with campaign selling; and in "When to Direct a Special Effort," I wish to dwell upon the marked importance of considering other details than merely the greater number of articles sold.

The term straight canvassing has had at least a dozen interpretations. This, of course, has grown out of the necessity of caring for properties or cities of different sizes. The large city is justified in putting on an elaborate system, in which office help arranges each days prospects for work, in the exact order in which reported. That is, the "call backs" and the so called dead service calls are arranged, checked in, and checked out for the regular salesman, by some one whose sole duty it is to look after this detail. There is no doubt as to the justification of this necessarily increased expense. Results everywhere have proved it. The salesman leaves for his work with an energy and a spring which are forced upon him, because he is really doubting whether or not he will be able to make all the calls laid out for that particular day. He is alive and doing and, therefore, everyone upon whom he calls feels the atmosphere of energy, and a "positive condition" as it were, has been unconsciously established. The direct result is, as the poorest sort of a salesman will quickly admit, a positive feeling of confidence and forcefulness; therefore, positive statements and much more frequent positive sales. Whereas, each one of a group of men not similarly directed, even though naturally energetic, will go out from the office with a mind full of possible calls, an indefinite mass, and will complete the day in having only touched the points of least or no resistance, so energy has been sapped with frequently nothing to show for it. If ambitious he will soon become sore on his job, and also on his employer. He travels in circles. His uncultivated resourcefulness frequently veering him into the cigar store, the grocery, the bar-room, in hopes of striking a possible prospect for a sale. He is conscientious in his hope, too, in the beginning. It simply grows out of the lack of having been directed in his effort.

The smaller cities and towns have to look a little harder to see justification of expense in card files, records, etc., necessary to properly direct and follow up regular house to-house canvassing; but I wish to state positively that my short experience has made me firm in the opinion that I would follow this method, in the handling of even the smallest property; that is, if any solicitation whatever for new business was practical. We are all more or less familiar with this phase of to-day's new business efforts, so that the more important topic is, whether or not special campaign selling is feasible and practical, in its application to the smaller company's needs and possibilities. We may feel favorable to such methods, and then discover, when attempting the first step, that the visionary points in its favor have been blotted out by the necessary mesh of details called forth by need for separate handling from other departments. It is, therefore, quite likely that we will become antagonistic to this method of selling. To be fair to the subject, we must restrict ourselves to one side of the question. I choose the side in favor of campaigns. This subject was too exhaustively submitted to the National Commercial Gas Association last fall, by Mr. James P. Hanlan, of the Public Service Gas Company, New Jersey, for me to undertake to add to his statements. We had our own experience in New Orleans, having conducted a Reflex lamp campaign, beginning October 1st last year, and ending December 31st. It was successful. There where outcroppings at later dates, of little unpleasant features; but, viewed from all angles, the experience to the New Orleans Gas Light Company was valuable and the return profitable. Because of some of these experiences, there has been evolved and developed a different scheme of selling, that is to my mind good and big from every angle. With your permission I wish to outline that proposition, and draw comparisons of its features, as against those of a campaign conducted by a company itself, just as our original campaign was.

The whole proposition, boiled down to a definite statement, is that a man, agency, or firm, proposes to sell to the gas company an account on which the article, be it lamp, iron, or any appliance, has been sold and connected, and a first payment or cash total turned in with the order. The gas company's whole operation and risk assumed in the transaction, being to collect the balance due in installments, furnish room for the handling of the campaign, and to take care of, and be responsible for, the actual working stock of the enterprise.

The gas company pays to the agency a certain fixed amount for each completed order. The order having been taken at a price to the customer, enough in excess to the amount paid the agency, that it will return a legitimate profit on the transaction, sufficient to justify the endeavor. I do not wish to recommend any set figures representing what should be paid to any such selling agency, or what should be charged to the consumer. I mean that the difference between the account opened and the amount paid for that account, is a matter for the consideration of only those who are directly interested. There are a great many details necessary to be worked out, in order to make this selling plan of interest and benefit to any gas company.

The salesmen are not allowed to collect any money, but are followed up, the next day, by an experienced supervisor who connects the appliance and collects the payment specified, thus eliminating "phony" orders. Another safety valve, with many virtues, is that the gas company should furnish the campaign company with an accurate list of its consumers. This can be taken from the addressograph, or whatever takes its place. You will possibly think that I have contradicted my earlier statement of the slight duties falling upon the gas company, but I really had this in mind at the time. It is covered in the remark that the gas company is to collect the balance of the installments. The accounts must, of course, be placed upon the company's books, and when sales orders are turned in from calls made upon consumers who are listed, it is no extra work for the salesman to mark upon his order, the ledger number or folio number of that particular account, from the list. The most annoying feature of the necessary bookkeeping is thus overcome, before the order gets to that department. Besides this advantage, there is the opportunity of increasing sales, growing out of the fact that each man has definite calls to make. It is also a big advantage to the green or the itinerant salesman, to be able to walk up to Mrs. Jones' house, and inquire if Mrs. Jones is in, rather than have to ask who lives there. Further benefit accrues frequently in combination properties, to be able to meet inside criticisms of trampling a little upon another department's possibilities, by thus proving that you are only endeavoring to improve conditions for your own consumers.

I realize fully that the points just mentioned are not such as go only with a campaign handled by an outside interest. They could

be just as successfully applied to one carried by a gas company itself. I am mentioning them because they have been tried out in the compaign lately conducted for us by such an agency, and were not as our own first endeavor. Therefore, I hold them to be a part of the proposition advocated.

Coming to the exact and positive differences, we find that all resulting complaints handled by the agency, sidetrack a certain amount of bitterness that is more or less prevalent in some minds, when entering any complaint about the service or treatment from public utilities.

The greatest item in its favor is this: Small gas companies cannot, in my opinion, afford to experiment with a special campaign under their own direction, because these facilities and resources are not equal to the sudden demand for a good campaign manager, the number of experienced men, the widespread publicity, the proper and accurate caring for indefinite details, which are necessary for the success of the special undertaking. Frequently an appropriation sufficient to advantageously finance the endeavor cannot be had. Everyone of these necessary factors being removed, are assumed by the agency. This, together with the important fact that you are not making an outlay for unmoved stock, definitely removes every element of risk, from the gas company. Each of these features being proportionately applicable to the large as well as the small gas property, I am convinced that the privilege of buying an already sold and connected gas consuming appliance at a profit, has a great advantage over a local company undertaking to accomplish the same end, and carrying the risk. It, of course, finally depends upon the sort of man or men in charge of the agency, the strength and merit of the organization which they carry, then your own co-operation and sympathy with the effort. It is certainly a great boon to commercial managers to be thus able to increase appliance sales, without assuming any of the risks and increased responsibilities, which had heretofore rendered the attempt infeasible.

Granting campaign selling in any one of its various forms to be a successful venture, we must take into consideration the effect of such sales upon our consumers. We naturally feel that a lamp campaign should be conducted in the fall, an iron campaign in the summer and so on, and without further inquiry, plan accordingly. There is a marked danger in this because it is superficial. It is necessary to consider exactly what is to be said about the article, what sort of advertising is to be carried, before picking specific date. For instance, last summer, in choosing the month to begin our Reflex lamp campaign, I was sure that one of the early fall months was correct, because of the increasing need for light, the opportunity for getting full benefit of all the winter's usage, and the lack of necessity for argument as to whether gas light was too warm for a home. I felt that I had added the final stroke of ingenuity in choosing October, because then the yearly migration of renters was past, and there could be no possible sale lost through an anticipated change of address. I was moving in the right direction, but I fell down completely on a very vital point. Our advertising was based upon the economy of an inverted gas burner over all other gas lighting fixtures. We had already a great number of gas light consumers. Our new lamp was immediately an article of interest because we guaranteed economy, and we were positively correct in our statements. The majority of our sales were made in October. You readily understand that in New Orleans the gas bills would just start on their winter increase with the month of October meter readings. Thousands of lamps were bought to decrease lighting bills, but regular conditions increased gas bills. Therefore, hundreds of consumers kicked on the lamps as being misrepresented, and frequently laughed at their own previous simplicity in believing that the gas company would make such an extensive effort to cut gas bills. You see the result. The big educational gain was totally lost. We gained criticism instead of confidence. November would have been a better month; December best of all.

Illustration carries more weight as a recommendation for extreme care in choosing when to undertake your special work, than for me to take up more time, in endeavoring to outline some of the almost infinite number of conditions which must be considered in their possible effect upon your effort. Any method of selling becomes laudable and good only when you have eliminated every possible handicap and deleterious after effect. And this can only be accomplished by the strictest application of your own experiences, coupled with the safe and sane advice of those who have had more experience. We can only succeed and grow by aiming to do our task a little better, and a little more thoroughly, than someone else would do it.

A New Factor in Metal Failures.

[By Mr. Ernest A. Lewis in *Metal Industry*.]

It has always been assumed that when copper, tin, zinc and lead are alloyed by melting together, that only complicated chemical processes could separate them. This is now known to be a delusion; they can be separated by physical means. Professor Turner, in the course of experiments, found he could separate copper and tin from lead and zinc at a red heat in a vacuum. This is rather a difficult process, although it will probably be eventually worked commercially. The writer has found that in an atmosphere of hydrogen, zinc and lead can be separated from copper and tin at a red heat, considerably below the melting point, but not so well as in a vacuum. There being always 3 per cent. or 4 per cent. of zinc left in. The importance of this fact to the metal rolling business will be appreciated, when it is seen that hydrogen is a reducing gas. In coal gas also, there is a volatilization of zinc, but not so much as in hydrogen, and carbon dioxide is apparently inert, as I have heated brass in a current of it and found no volatilization.

Manufacturers often find red places on the surface of brass sheets after they have been annealed and pickled. Various suggestions as to the cause of this have been brought forward. An old suggestion was that it was due to sulphur in the coal, another suggestion that is in some cases reasonable, is that it is due to iron in the pickling baths, but these peculiar marks occur also when no iron is present. The probable cause of these red patches, is that a reducing atmosphere is formed in the annealing furnace, long enough to volatilize the zinc on the surface, and leave the copper behind. Incidentally the experiments showed that although brass may contain traces of oxide it is not an essential constituent, as it is of copper. In every case the turnings or sheets were perfectly soft and there was no sign of brittleness, while everyone who has heated copper in such a way as to reduce the oxide in it, knows how brittle it becomes.

In locomotive types of boilers with brass tubes, it has often been noticed that the ends near the fire are corroded away. It is usually assumed that chloride in the coal is the cause, but it seems to me that the action is more complicated. A reducing atmosphere may be formed; this would favor volatilization of zinc, in conjunction with chlorides and sulphur, would cause rapid deterioration. The alteration of surface composition in yellow metal sheets for sheathing, would also hasten corrosion in sea water. These alterations cannot be due to bad mixing of the metal at the time of manufacture, as has been suggested; but if the zinc can volatilize under certain conditions it would account for corrosion in patches.

The only satisfactory way to anneal brass is in furnaces where the flame does not touch it.

Co e Breaks Record.

The coke industry of the United States has now reac hed the $100,000,000 mark, and there is a steadily growing increase in the proportion of coke made in by-product and retort ovens. The valuable by-products, gas, tar, ammonia, etc., are saved by this process, to the value of tens of millions of dollars annually. Where the coke is made in beehive coke ovens all these valuable by-products are wasted.

In 1912 the total production of coke, according to Edward W. Parker, of the United States Geological Survey, was 43,916,834 short tons, valued at $111,523,336. The production of beehive coke increased 5,164,701 tons, or 18 per cent., while retort coke increased 3,200,644 tons, or 49 per cent. Although larger than in 1911, the output of beehive coke did not reach the record figures for 1910.

The following table shows both the general increase in coke production and the rapid strides by which the by-product industry is overtaking the beehive production.

Year.	By-Product Coke.	Beehive Coke.	Total.
1893	12,850	9,464,730	9,477,580
1901.....	1,179,900	20,615,833	21,795,883
1907.....	5,607,899	35,171,665	40,779,564
1908.....	4,201,226	21,832,292	26,033,518
1909	6,254,644	33,060,421	39,315,065
1910.....	7,138,734	34,570,076	41,708,810
1911.....	7,847,845	27,703,644	35,551,489
1912.....	11,048,489	32,868,344	43,916,834

The number of retort ovens in operation increased from 4,624 in 1911 to 5,061 in 1912, a gain of 437, whereas the total number of all ovens decreased from 103,879 to 102,080, indicating that there were

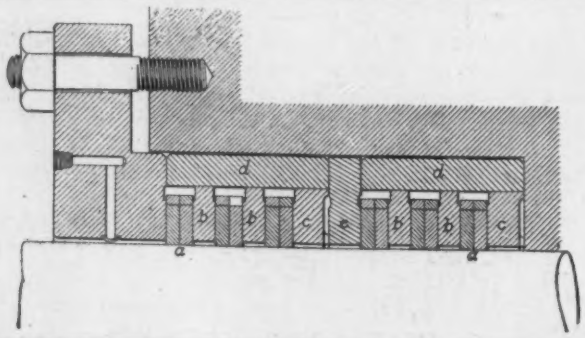
2,236 fewer beehive ovens in operation in 1912 than in 1911. Some new ovens of the beehive type were built in 1912, but the number abandoned exceeded these. There were nearly 1,000 retort ovens under construction at the close of the year, and contracts had been made for the construction of a number of additional plants. The marked progress made in retort oven construction in the last two or three years, and the new work under way or in contemplation, are carrying forward the revolution in coke making, which was noted as inevitable in one of the earlier Survey reports. This revolution consists in the gradual substitution of retort ovens for the wasteful beehive type, and in shifting the coke making industry from the vicinity of the mines to the centers of manufacture and population, where the gases can be utilized.

The quantity of coal required to produce a ton of coke is much less than formerly. The average gain in 1912, compared with 10 years ago, is at least 160 pounds. It is doubtful if in the earlier years the actual yield from coal exceeded 60 per cent., whereas in 1912 it was 67 per cent. This gain is largely due to the increased production of by-product coke.

In Illinois, Indiana, Massachusetts, Michigan, New Jersey, New York and Wisconsin, where coke is made exclusively in by-product plants, the yield varies from 69.6 per cent. (in Wisconsin) to 81.8 per cent. (in Indiana); in States where beehive practice prevails, the yield varied from 50 per cent. (in Georgia) to 66.5 per cent. (in Pennsylvania.)

New Methods and Appliances.

AN IMPROVED TYPE OF PACKING FOR GAS ENGINES.—A new packing has been devised by James Horton, efficiency engineer of the Homestead plant of the Carnegie Steel Company, for the piston rods of double acting gas engines, such as are now in common use in large plants. The packing rings proper, *a*, which are shown in contact with the rod, are placed in grooves. The walls of these grooves, *b*, *c*, have a slight lateral movement in line with the rod, and thus bind the segmental packing rings, *a*, sidewise, against forcible inward closure, by pressure in the cylinders. In practice it has been found that this side clamping of the ring does not affect the sealing quality of the packing, since the contact with the rod is always sufficient to prevent passage of gases, and is yet very light. Some of the original packing has been in service for over 2 years on one large engine, and at the present time, no wear can be detected on the rod. The packing, as a whole, consists of segmental packing rings, *a*, a partition between them, *b*, and a clamping or pressure ring, *c*. These latter are turned to a working fit within the ring, *d*, which is a plain, cylindrical filler ring, and *e* is a ring dividing the packing box into two compartments.

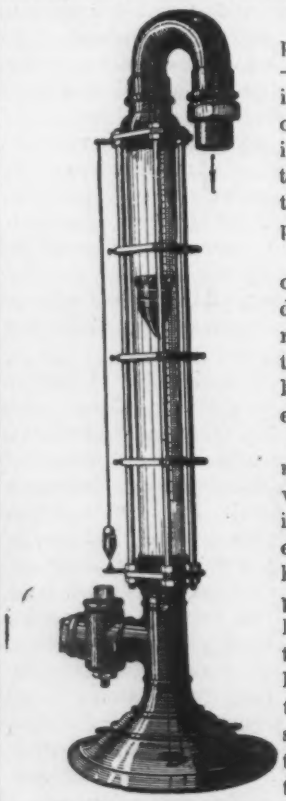


The working principle of the packing is that the pressure from the cylinder, enters the groove in the face of the ring, *c*, and forces it, together with *b* and the intervening packing rings *a*, hard against the division ring *e*, thus binding and holding the packing rings proper. In this way pressure that may accumulate in the space around the outer diameter of the segmental rings, *a*, tending to force them hard against the piston rod, is resisted, thus preventing excessive wear of both the packing and the rods.

THE ROTAMETER.—"The Rotameter" is a new instrument which indicates, in the simplest manner the volume of gas (or liquids) consumed per hour. It does not, however, measure absolute quantities like an ordinary gas or voltmeter, but measures the force of the gas current as an air meter measures the force of an electric current.

The instrument is based on the following principle: The gas current which is to be measured flows through a vertical glass tube, the inside diameter of which increases continuously from the bottom to the top. Inside the glass tube is a conical float which rises to a certain height when gas is flowing through the former. The lift of the float depends upon the velocity of the gas or upon the volume of gas going through the tube in an hour, minute or second. On the float is a notched cylindrical rim. The gas, shooting through these notches, rotates the float like a Segner waterwheel, and this rotation always keeps it in a vertical position and prevents friction on the wall of the tube. On the body of the float is a white, spiral line which makes visible its quick rotation, and thus one can note if the meter is working or not.

The glass tube is graduated on the outside, and the calibration is obtained empirically, since its interior cannot be made with absolutely uniform slope. The scale on the glass tube may be made to read directly in cubic feet per hour (minutes or seconds) or in millimeters. In the latter case, tables are furnished with the meter for the determination of the exact volume of gas in cubic feet flowing through the meter. The instrument works as follows:



The float is lifted by the gas until the power which forces the gas current past it —*i. e.*, the loss of pressure at that point, is equal to the weight of the float; or, in other words, the float is lifted so high that it leaves an opening between itself and the inside wall of the tube which allows the gas to flow through with a drop in pressure equal to the weight of the float.

The reading of the meter depends, of course, upon the density of the gas, as a denser gas, for the like loss in pressure, requires a larger area for the passing of the same amount of gas. It, therefore, lifts the float higher and gives an apparently larger reading than a lighter gas.

Rotameters are well adapted to measure, regulate and control the quantity (or the velocity) of gases in pipe lines. They are installed directly in the line. The smallest current will lift the float at once and hold it at a height corresponding or proportional to the velocity of the gas in the line. The scale on the outside of the glass tube gives directly the quantity of gas per hour (minute or second), and no calculations whatever are necessary. The instruments are manufactured in different types: 1, meter; 2, regulator; 3, controller; 4, leak detector.

1. The Rotameter has an empirically calibrated scale on the outside of the glass tube, and it may be used with success in almost every chemical or physical process for the exact and quick determination of

a. The quantity.
b. The velocity.
c. The consumption.
d. The moisture.
e. The quality of gas.

A few examples may show its wide range of application:

Controlling and checking all kinds of measuring devices (gas meters, manometers, anemometers, etc.), measuring the gas consumption of, and passage through burners, valves, radiators, cutting and welding burners; determining the air consumption instruments using compressed air, of ventilators, compressors for gas engines; controlling the volume of gas manufactured in gas plants, in blast furnaces and in any other industrie, mechanical as well as chemical and metallurgical.

2. The "Rota Regulator" is built and designed after the same principle as the Rotameter, differing from it by its scale not being calibrated in cubic feet per hour (minute or second), but in millimeters. This makes it much cheaper than a meter since, as has been stated before, the calibration in cubic feet has to be made anew for each meter. For the benefit of the user, the instrument will be furnished with (besides the millimeter scale) a white strip on which a calibration may be made. The regulator is a valuable instrument for the chemical, or many other industries, because it is the most sensitive consumption or pressure regulator on the market.

3. The Rota Controller, also not expensive, has a smaller scale than the rotameter; but it is not, by any means, inferior to it. It is calibrated for air or water only, but it may be used for other liquids and gases for which tables are furnished. Wherever it is not necessary to obtain absolutely right and correct measurements, but where readings are wanted which are reliable to a certain extent, a "Rota Controller" will prove of excellent service.

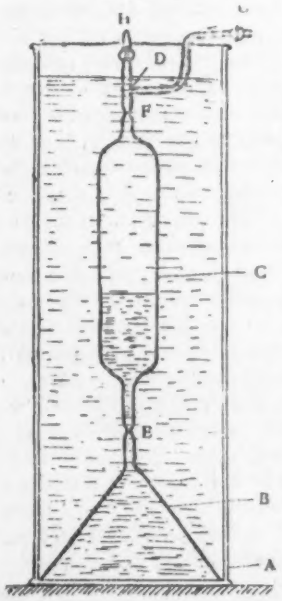
4. The "Rota-Leak-Detector" serves for the immediate detection of leaks in gas lines, and for the prevention of gas losses and gas explosions in private residences, apartment houses, office buildings, manufacturing plants and streets.

The operation of the instrument is as simple as that of an ordinary gas cock, and a false movement of the valve handle, through which lights are turned out, is impossible.

For testing purposes, a *Pocket Rotameter* has been designed which measures from 1 to 20 cu. ft. per hour, having a scale 6 inches long. It is furnished with a nicely finished wooden box and can be easily carried around and applied for testing lamps, etc.

A Simple Form of Apparatus for Determining the Specific Gravity of Gas.—Mr. A. R. Myhill, in the *Gas World*, says that in these days of incandescent and high pressure gas lighting the accurate determination of specific gravity is of considerable importance, and it behoves the gas engineer to keep his gas of uniform density, if the consumer is to obtain the best results from its use. The specific gravity apparatus is taking a prominent place in the laboratories of of most up-to-date gas works, and a description of a reliable instrument, which can be made by anyone possessing a rudimentary knowledge of glass-blowing, may not be out of place. It possesses one or two marked advantages over the type usually sold, is cheap, and accurate in operation.

The diagram gives a general idea of its appearance. The jar, *A*, is 3 inches in diameter by about 14 inches high, and is filled with gas water when in use. Inside this is the receptacle for the gas to be tested, consisting of 3 parts. *B* is a glass funnel with short stem, and serves as a stand or base. The part, *C*, is made from the bulb of a 100 c.c. pipette, the stem being fused to the shortened stem of the inverted funnel, *B*. At *F* and *E*, the stem is constricted somewhat, and a line scratched on the glass at these points. A straight piece of $\frac{3}{16}$-inch glass tube, provided with a stopcock, *H*, is fused to the upper end of the pipette, and a branch connected to this tube, provided with another stopcock, *G*. As close to *H* as possible, the tube is drawn out and *nearly* sealed up. Care should be taken not to make this point too acute, as the end is liable to be broken off.



In using the apparatus, the gas tube is connected at *G*, and gas allowed to flow through the tube and out at *H*, for 5 minutes or so, the apparatus being immersed in the water during this time; *H* is closed and the pipette raised in the jar, so as to fill the bulb and about half the funnel with gas. While in the raised position, *G* is closed, and the instrument lowered to the bottom of the jar. It is well to keep the finger on the point, *H*, so as to prevent any diffusion into the air of gas contained in the tube between the closed tap and the point, although this may not be necessary when the funnel is nearly full of gas, as this gas will, in a later stage, displace the air before the water rises to *E*.

In making a test, *H* is opened full, and the gas allowed to escape into the air. When *E* is reached by the water level, the stop-watch is started, and stopped when the water reaches the top mark, *F*. This should be about 300 seconds. If less, the opening at *H* should be made smaller.

After carrying out the test with gas, the apparatus is filled with air, by raising and lowering in the water with both cocks open, and the time for this air to discharge through *H* taken, and the specific gravity of the gas is calculated from the formulae:

$$\text{Gas sp. gr.} = \frac{(\text{Time of discharge of gas})^2}{(\text{Time of discharge of air})^2}$$

New Type of Boiler Setting.—A modification of the usual horizontal tubular boiler setting is shown in these illustrations taken from a bulletin of the Travelers' Indemnity Company, of Hartford, Conn.

The two distinctive features of the setting are the furnace arch *A A*, and the air duct *B B*, admitting secondary air through the bridge wall. In the ordinary form of setting for horizontal tubular

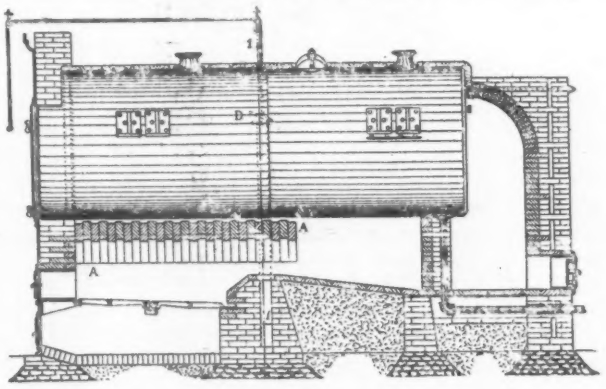


Fig. 1.—Vertical Longitudinal Section Through Boiler Setting.

boilers, the fire sheet of the shell, relatively probably 2,000° cooler than the burning gases in contact with it, acts as a check upon combustion by its chilling effect, and is itself subject to most destructive strains. The deflecting arch, as shown by the sections, ends just back of the bridge wall, and the faces of fire brick are staggered to form projecting rings on its surface. This arch accomplishes two

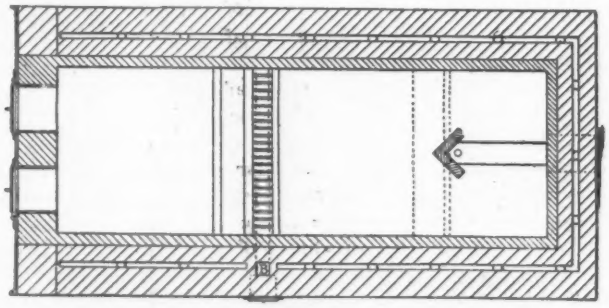


Fig. 2.—Horizontal Section Through Boiler Setting.

things: Facilitates better combustion of the furnace gases; and distributes over the shell and tube surfaces the excess of work usually put upon the fire sheet. Both of these increase the efficiency of the boiler as well as add to its life. In order to stand up under the high heat to which it is subjected the arch must be carefully laid, with good blocks for the end thrust, and segmental brick of the proper radius, with thin points of fire clay. If constructed in this way there should be no trouble in maintaining it.

The auxiliary air supply to the hollow bridge wall enters through the duct *B B*, controlled by the damper *D*; to the transverse passage *C*, which is provided with a clean out door; and then up and out through $\frac{1}{4}$-inch spaces between the fire brick in the crown of the

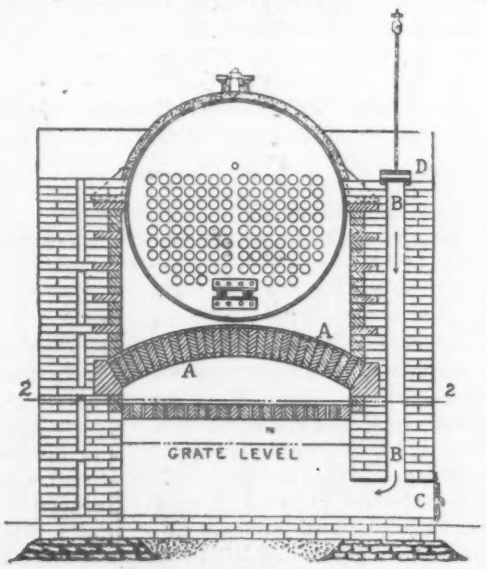


Fig. 3.—Section Through Ignition Arch.

bridge wall. The air is warmed in passing through the ducts, and is then introduced to the burning gases at what has been experimentally determined is the best point for its addition. These modifications are in no way radical, and need only to be better known to be more extensively adopted.

Book Reviews.

"*Handbook for Gas Engineers and Managers*," by Thos. Newbigging: Eighth edition, published by Walter King, London: 578 pages, 5½ by 7½, illustrated. Price, $6.50. The handbook has been out of print for almost 2 years, and the author has devoted most of that time to revising it for this eighth edition. It is the one book indispensable to the gas man, brought up to later day practice.

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 20 cents.

1,062,640. High Temperature Gas Burner. A. Eimer, New York City.
1,062,670. Removable Gas Burner for Ovens. G. A. Tinnerman, Cleveland, O.
1,062,712. Gas Generator. H. W. Jacobs and H. H. Lanning, Topeka, Kas.
1,062,721. Gas Producer. W. F. Luick and A. J. Bassett, Milwaukee, Wis., assignors to Luick, Bassett Producer Company.
1,062,983. Gasometer. F. J. Mayer, New York City, assignor to Stettiner Chamotte-Fabrik Actien-Gesellschaft vorm. Didier, Stettin, Germany.
1,063,024. Gas Producer. C. M. Garland, Collingswood, N. J., assignor to Camden Iron Works, Camden, N. J.
1,063,081. Apparatus for the Production of Air Gas. W. Thiem, Halle-on-the-Saale, Germany, assignor to Svend Olsen, same place.
1,063,217. Gas Heater. J. T. Reznor, Mercer, Pa., assignor to Reznor Manufacturing Company, same place.
1,063,238. Gas Measuring Instrument of the Wet Meter Type. H. Aron, Wilmersdorf, Germany.
1,063,264. Gas Furnace. L. Jacobson, Los Angeles, Cal.
1,063,382. Process of Manufacturing Gas H. Pettibone, New Rochelle, N. Y., assignor to the Power and Mining Machinery Company.
1,063,392. Gas Lighter. J. K. Rush, Syracuse, N. Y.
1,063,540. Gas Producer. J. A. Herrick, New York City.
1,063,649. Prepayment Meter Mechanism. W. L. Brown, Lansdown Pa.
1,063,772. Gas Burner. H. A. Chippendale, Wethersfield, Conn., and M. Kimmell, Providence, R. I.
1,063,932. Gas Pressure Regulator. P. Keller, Chicago, Ills.
1,063,933. Gas Regulating Device. P. Keller, Chicago, Ills.
1,064,107. Gas Plant. C. L. Straub, Milwaukee, Wis., assignor to Power and Mining Machinery Company, New York City.
1,064,505. Gas Burner. M. W. Longfellow, Baltimore, Md., assignor to Baltimore Gas Appliance and Mfg. Company, same place.
1,064,517. Gas Burner. F. Minnick, Hamilton, O.
1,064,609. Gas Regulator. H. M. Caldwell and T. Smith, London, England.
1,064,625. Method of Producing Gas. O. H. Ensign, Los Angeles, Cal.
1,064,626. Method of Producing Gas. O. H. Ensign, Los Angeles, Cal.

Items of Interest
FROM VARIOUS LOCALITIES.

ACCORDING to advices received from Newark, N. J., dated June 28th, we are informed that the New Jersey Board of Public Utility Commissioners, earlier in the week, had refused approval of the two ordinances under which it was proposed to supply gas to the residents of Weymouth and Buena Vista, two settlements in Atlantic County. The Buena Vista ordinance would grant a franchise to the Millville Gas Light Company's proprietors, and the Weymouth ordinance conferred like powers on the New Jersey Gas Company, which corporations are virtually competing concerns. The latter objected to the approving of the Buena Vista grant, alleging that its procurement was secured by the Millville corporation with the single plan of harassing the New Jersey Company in its ways for extending. It was further noticed that the proposed selling figure of $1 per 1,000 was a rate so low that not even a living save a profit could be made under it. The Board, however, from the testimony of experts, inclined strongly to the view that the latter objection was not tenable, in that the dollar figure permitted of a reasonable profit; but the Board did object to provisions in the proposed grant seeking to regulate the maximum price, regarding it as an interference with the Board's lawful prerogatives in such respect. Like objections were cited in the instance of the sections regulating the laying in of services, the forbidding of minimum charges for meters in tenantless houses, the type of apparatus to be installed, etc. In the end the Board intimated that, if the ordinances were altered to meet the dissent expressed, approval would be registered. In negativing the Weymouth proposal the Board descanted over the omission of the New Jersey Company to make adequate provisions for the installation of the necessary plant and appurtenances. The Board, in fact, declared that the scheme to supply gas in Weymouth township was bound up in the idea that the Company would also be granted a franchise under which it could also operate in Buena Vista township which territory had already been pre empted in the grant issued to the Millville Company. The Weymouth ordinance was rejected without prejudice to or for the renewal of the petition following a change in the existing circumstances.

MESSRS. DEILY & FOWLER, of Philadelphia, have been awarded a contract for the construction of the 100,000 cubic feet capacity storage holder, to be operated in connection with the Fulton plant of the Richmond (Va.) municipal gas supply.

"C. S.," writing from Los Angeles, Cal., under recent date, says: "The Los Angeles (Cal.) Gas and Electric Corporation, one of the largest public service corporations on the Coast, on a recent Saturday 'took a day off,' during which time its officers and employees played in Fourth Annual Picnic. The Company has this big time once a year, and so successful have these outings become, that they now may be regarded as fixtures for many years to come. Everything connected therewith is furnished free by the Corporation; and the elaborateness of the happening this year can be judged from the fact that the Company's bill for 1913 in this connection totalled close to $9,000; but nearly 4,000 people had a share in the Company's unrestrained hospitality. Of course, the luncheon was about the most expensive item; but it included chicken sandwiches—real chicken, mind you, of the best Los Angeles hatch—along with the more plebeian ham, tongue, cheese, etc., types. One would not think that so many peanuts were ever roasted, that punch, lemonade and other 'coolers' were as plentiful as air breezes, and could be found in 'Old oaken buckets' that studded the grounds. The method of serving the lunch was so well planned that the great crowd was served in not much over a-half-hour, everyone getting like things in similar portions. In arranging the service the Company simply brought into play the same methods that prevail in the sectionalizing of its own huge business, and which have so largely led it to success. Here is the plan, simple but most effective: The partakers filed past long lunch counters, each carrying a lunch ticket, issued the day before. Waiters passed out boxes of lunch in exchange for the tickets. At other counters conveniently placed coffee urns were drawn on for 'piping hot' coffee; and each lunch contained a ticket which could be exchanged at one of the many stands for a dish of ice cream. The programme carried a long listing of athletic sports, and numberless dances as well. Two events in respect of the athletic planning engaged virtually the attention of all. The first of these was a baseball contest between nines representing the office force and the mechanical force; the other a tug of-war between teams representing 6 divisions of the Company's service. Challenge trophy cups had been donated by Mr. Walter B. Cline, President of the Los Angeles Gas and Electric Corporation, for both events. The cup for the baseball game, donated last year, was then won by the office force; but it was different this year, the 'mechanics' proving their prowess in a score of 12 to 5. The big difference in the score, however, was unfortunately traceable to the fact that Walter Swartwout, catcher for the office team (and its mainspring) unluckily had one of his fingers put out of joint in the first inning, the accident, of course, necessitating the putting in of a substitute. The cup on tug-of-war account was donated this year for the first time, and it was won by the team from the gas works, pulling against teams picked from the electric shop, the gas shop, and a combination composed of employees from the manufacturing, store and transportation divisions. Win-

ners of other athletic events were: Broad and high jumps, J. B. Powell, office force; 100 and 220 yards dashes, A. B. Mauch, gas works force—he also won the shot putting contest; the half-mile sprint, by E. A. Boulger; and the mile relay race went to a team from the electric shop. Especial attention was given to the children. A section of the grounds had been set apart for them where the 'kiddies' were kept busy in the swings, 'teeters,' merry-go-rounds, and the like that so delight them; but the crowning glory of it all to the juveniles was in the riding round the ring on the backs of a corral of burros, who actually seemed to share in the joys of their drivers. Long may the days of President Cline, of the three Vices (Baurhyte, Vance and Houghton) and of Messrs. Day, Luckenbach, Parks and Kister, be in the direction of this successful Corporation; for these are Directors the weight of whose directing is always in line of decreasing the burdens which fall to the lot of those in their employ."

THE City Solicitor, of Columbus, O., has retained Mr. E. W. Bolin to examine the books of the Federal Gas and Fuel Company, in the suit brought by the city for an accounting He will work in conjunction with Mr. J. O. Crawford, who will act in like capacity on behalf of the Company.

"THE Port Arthur (Tex.) Gas Company has grown to the point that it proposes to take office quarters in the new brick building that is being erected on Fifth street near Austin avenue. The structure is located in the best part of the business section of the city. This, too, mind you that it will not be ready to distribute gas until October 1st. However, there's nothing else like 'looking ahead!'—B. R. B."

A CORRESPONDENT in Paterson, N. J., writing under date of the 28th prox., says: "Paterson is on the 'edge' all the time, since the famous riots of the near time, and every move out of the common causes 'cautious investigation.' The latest instance in this respect read like this: Mr. Thomas Mahoney and his family, who reside in the premises, 681 East 28th street, happened to take a time off last week. During their absence Mrs. Chas. G. Beadle, a next-door neighbor, discovered that the cellar door in the rear of the Mahoney mansion had been forced. Naturally, she communicated with the police, and detective Connell was assigned to 'the job.' An examination of the premises revealed the fact that nothing seemingly had been disturbed, and the sleuth eventually discovered that an inspector of gas meters, in zealous pursuit of his duty, had knocked at the door that is usually 'knocked upon' when ingress is sought. Meeting with no response, he instituted an investigation and found that the cellar door readily yielded to his advances. On his way he entered the cellar, there to learn whether the meter was working or not! Hence the *denouement*."

THE contract-agreement between Commissioner Rourke and the Consolidated Gas Company, regarding the public street lighting of Boston, provides for a 10-year agreement, at the rate of $21.50 per lamp per annum, with the further proviso that a reduction of 60 cents per lamp per annum will be made for every reduction of 5 cents per 1,000 cubic feet (below a maximum of 80 cents) made by the Consolidated. Again, the contract contains an arbitration proviso, under which concessions are to be made relative to any saving that might be effected by the use of any automatic lighting or extinguishing device. It is likely that the agreement will be (as it seems to us it should be) assented to; and, if so, the work will be carried on by the Rising Sun Street Lighting Company, as sub-contractor under the Consolidated, as has been satisfactorily done for a long period.

"SUPER." MATLACK, of the Henrico County Gas Company, Barton Heights, Va., is sending out a right clever set of postal card shaped, blotter cards, which carry "reasons," both oral and pictorial, why gas cookers should be put in every kitchen in select Barton Heights. Here is the "sentiment" printed in bold letters on one of the thought provokers: "June brides should insist on Jewel gas ranges!" To be sure they should, and not wait until the ides of December are showing on the register of the seasons.

THE proprietors of the Berwick (Pa.) Gas Company report that the increase in earnings for the past month equaled 31 per cent. in excess of the corresponding month in 1912, with the certainty that the ratio will be maintained for the latter half of 1913.

THIS is from the Brooklyn *Daily Eagle* (a most reliable authority) of June 25th last: "The New York City Consolidated Gas Company has completed the absorption of the New York and Queens Electric Light and Power Company, which supplies all the electric current for light and power purposes for the 4 wards, Long Island City, Newtown, Flushing and Jamaica. It has also taken electric plants of the New York and Queens Gas Company, supplying the towns of Flushing, Richmond Hill and Morris Park, Woodhaven and Ozone Park, and the Jamaica Gas Light Company, supplying the villages of Jamaica, Hollis and Queens. The above transfer includes all the Companies furnishing light in Queens county, except the Newtown Gas Company, which is supplied by the Brooklyn Union Gas Company, which is largely owned by those interested in the Consolidated Gas Company. It is asserted that this complete control of the lighting and power interests of Queens by the Consolidated Company will result in important economies of manufacture, not to mention better service to the residents. The assets of the New York and Queens Electric Lighting Company, at the end of 1911, were $6,121,497; the volume of capital stock issued and authorized, March 12, 1912, was $2,500,000, of which half is common and half preferred. The assets of the New York and Queens Gas Company, at the close of 1911, were $1,790,813. The capital stock last year was $600,000. The number of public street lamps in Queens, as of June 1st, was thus returned: Gas (mainly of the Welsbach type), 6,277; tungsten incandescent, 7,487; arc electrics, 2,166."

THE people of Rockwell, Ia., have been clamoring for a gas plant, and we regret to say that Messrs. W. B. Bruce, M. Dexter, W. F. McClelland, F. C. Seigfried and P. D. Bristol, who are proposing to appease the clamorers, have about determined to construct a plant on the "Cold Process" type. The people might better have waited a while longer, or for the period when a sensible example of the "hot process" system could be installed.

AT the special meeting of the shareholders in the New Haven (Conn.) Gas Light Company, held for the purpose of considering the proposition to increase the capital stock to $10,000,000, from $5,000,000, such amendment to the Company's charter was assented to and ratified. The new capital will be issued from time-to-time, or when best suited to meet the business demands of the corporation.

ADVICES by way of Philadelphia are to the effect that arrangements have been made under which the Harrisburg (Pa.) plant of the U. G. I. Company will distribute to its consumers gas made in the coke ovens of the Pennsylvania Company's coke oven plant at Steelton, Pa.

THE gas plant at Milton, Pa., has gone into the properties of the Northumberland County Gas and Electric Company.

THE petition of John H. McMurray and others, asking that the Connecticut Public Utilities Commission issue an order that will reduce the selling rate of the Bridgeport Gas Light Company to 80 cents per 1,000 cubic feet, will be held Wednesday week. This looks a confiscatory rate for Bridgeport; in fact, the current rate ($1 per 1,000 cubic feet) seems a fair one in all respects.

DR. HOLLIS GODFREY, Public Lighting Inspector for Philadelphia, now it would seem is, despite his recent emphatic statement that he would not accept the task permanently, involved in the predicament of the person celebrated in literature of the long ago, saying "She would ne'er consent, consented." Some months ago he would only remain on the job until Director Cooke could secure somebody from the Civil Service list. The last list certified that only two aspirants qualified, whereupon the Director exercised his right to decline to accept a list bearing less than 4 names. A new examination has been ordered, and, lo; behold! It is now said the Doctor will take the examination. That sure $5,000 per, and the office-given right to make it unpleasant for the lighting purveyors, seem to have been the silent arguments which caused the Doctor to change his attitude.

THE Public Service Gas Company, of New Jersey, is extending its mains to and through the romantic district of Singac. A score of years ago he who predicted that Singac Falls and vicinity would have a gas supply ere 20 years had passed would surely have been looked upon askance.

IT is quite safe to say that certain interests close to the Washington (D. C.) Gas Light Company have purchased the Roslyn (Va.) Gas and Electric Company, safe mainly because such acquisition has been denied at the offices of the aforesaid asserted purchaser.

The Market FOR GAS SECURITIES.

Whatever change occurred during the week in nominal value of Consolidated was to the good, the gain being to all intent 1 point in the bid. The opening to-day (Thursday) was 129⅛ to 129½; but, like the weather, the trading was of the evaporative sort. The market is still harping over the loan recently put out by the Company; but holders may rest assured that men like Messrs. Cortelyou, Carter and Addicks are to be depended on to do the right thing, even when dealing with the great City Bank folks. The writer knows of a "small trifle" of 500 shares that was taken for investment this week by one of the shrewdest fire insurance men in America. The electric end of the corporation is going great guns.

The mystery of the market is the nominal valuing of Brooklyn Union by speculators. Here is an industrial corporation that is serving a district the population of which certainly is not less than 2 millions of people. The capitalization of the Company roughly is 15 million stock and 15 million 5's. It is paying 6 per cent. per annum, and its surplus each year should be equal to 5 per cent. additional. Still it is nominally quoted at 124 to 129. However, while the ordinary speculator is seemingly satisfied to dabble in Distilling and Cattle Feeding, and other like varieties, it is fair to assume that the investor is also satisfied, since this enables him to put his money in safe payers at low prices.

In out-of-town shares there is little change to report. Peoples, of Chicago, is 110 to 111; Laclede common is 92 to 94. The Massachusetts Gas Companies shares are now on a 5 per cent. footing, the Trustees having voted to set aside $1,250,000 for dividends on the common stock, payable in four quarterly installments of 1¼ per cent. each, during the year to end June 30th, 1914. The Boston Consolidated Company has declared a dividend of 3 per cent., making 9 per cent. for the year, and the New England Gas and Coke Company's last dividend was at the rate of 4½ per cent. per annum, as against 3½ per cent. for the prior twelvemonth. The American Light and Traction Company has declared these dividends: Cash, 2½ per cent., payable 1st prox.; 2½ per cent. common stock and 2½ per cent. preferred stock, both issuable the 1st prox. The Pacific Gas and Electric has passed the dividend for the past quarter.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

JULY 7.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par alue of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$99,816,500	100	129⅜	129⅝
Central Union Gas Co. — 1st 5's, due 1927, J. & J.	3,500,000	1,000	101	103
Equitable Gas Light Co.— Con. 5's, due 1932, M. & S.	1,000,000	1,000	106	108
Mutual Gas Co.	3,500,000	100	157	157
New Amsterdam Gas Co.— 1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	99	101
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	59	62
1st Mtg. Gold Bds. 5 p. ct.	1,500,000	—	98½	100½
New York and East River - 1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	98	100
Northern Union— 1st 5's, due 1927, J. & J.	1,250,000	1,000	105	1[illegible]2
Standard	5,000,000	100	102	104
Preferred	5,000,000	100	9[illegible]	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	103	105
The Brooklyn Union	15,000,000	1,000	124	29
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106¾	107
Yonkers	200,650	500	130	—
Out-of-Town Companies.				
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	500,000	1,000	97	100
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47¾	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	59	60
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,860,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	87	90
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	86
Bonds, 1st 5's	3,822,000	1,000	98½	99
Laclede Gas Co., St. Louis.	10,000,000	100	92	94
Preferred	2,500,006	100	—	102½
Bonds	10,000,000	1,000	102½	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,370,000	50	120	120
Madison Gas and Electric Co. " 1st Mtg. 6's	400,000	1,000	106	
Massachusetts Gas Companies, of Boston	25,000,000	100	90	90½
Preferred	25,000,000	100	87	—
Montreal L. H.& P., Canada	9,000,000	100	211	212
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	97	98
Bonds, 6's	6,000,000	—	127	128
New Haven Gas Co.	5,000,000	25	182	190
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	110	111
1st Mortgage	20,100,000	1,000	102	102½
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104½	105½
Pacific Gas and Electric Co.	15,500,000	—	86	87
St. Joseph Gas Co.— 1st Mtg. 5's	1,000,000	1,000	93	94
St. Paul Gas Light Co.	2,500,000	100	—	—
1st Mortgages, 6's	650,000	1,000	104	105
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	3,447,000	1,000	94	96
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	101	103
Washington (D. C.) Gas Co.	1,600,000	200	435	426½
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	—	—

MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, Richmond, Va., October 15-17, 1913. Officers: President, W. R. Addicks, New York City. Secretary, Geo. G. Ramsdell, 29 West 39th st., N. Y. City.

Canadian Gas Association.—Annual meeting Sept. 1913. Officers: President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keilior, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, New York City, Oct. 8, 1913. Officers: President, C. G. M. Thomas, Long Island City, N. Y.; Secretary, C. H. B. Chapin, 29 W. 39th street, New York City.

Gas Meeters.—Monthly Section Meetings; Grand Commissioner, I. W. Peffly, New York; Gen'l Sec'y, H. Thurston Owens, La Crosse, Wis.; New York Section, Chairman, W. H. Pettes; Secretary, G. E. Smith, Sipp Avenue, Jersey City, N. J. Philadelphia Section; Chairman, L. R. Dutton; Secretary, H. F. Patterson, Jr., 831 Chestnut street. Cleveland Section, Chairman, F. B. Hutchinson; Secretary, Wm. Holtz, East Ohio Gas Co. New England Section, Chairman, T. W Jennings, Boston; Sec., F. K. Wells, 60 Broad street, Boston. Winona Section, Winona, Minn., W. F. Clausen, Chairman.

Guild of Gas Managers of New England.—Annual meeting, March, 1914. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, Walter G. Africa, Manchester, N. H.; Secretary, H. K. Morrison, Brockton, Mass.

Illinois Gas Association.—Annual meeting, March 18th and 19th, 1914. Chicago, Ills. Officers: President, W. F. Barrett, Chicago, Ills.; Secretary-Treasurer, Horace H. Clark, 115 No. Oak Park avenue, Oak Park, Ills.

Illuminating Engineering Society.—Annual meeting,———— September, 1913. Meetings of Sections, monthly. Pres., Preston S. Millar; General Secretary, J. D. Israel, 29 W. 39th street, New York City. Sections: New York, Secretary, C. L. Law, 124 West 42d street. New England, Secretary, H. C. Jones, 10 High street, Boston, Mass. Philadelphia, Secretary, L. B. Eichengreen, Broad and Arch streets. Chicago, Secretary, J. B. Jackson, 28 North Market street. Pittsburgh, Secretary, J. C. Mundo, Oliver Building.

Indiana Gas Association.—Annual meeting, March —— —— 1914. Terre Haute. Officers: President, A. S. Cooke, Terre Haute; Vice-President, A. C. Blinn, Evansville; Secretary-Treasurer, Philmer Eves, Indianapolis.

Iowa District Gas Association.—Annual meeting, May, 1914; ———— Officers: President, B. C. Adams, Lincoln, Neb.; Secretary, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, October—— 1913. ———— Officers: President, L. O. Ripley, Emporia, Kas.; Secretary and Treasurer, W. H. Fellows, Leavenworth, Kas.

Michigan Gas Association.—Annual meeting, September, 17, 18, 19, 1913; ———— Officers: President, W. S. Blauvelt, Detroit, Mich; Secretary-Treasurer, Glenn H. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April, 1913; Mexico, Mo. Officers: President, P. A Bertrand, Joplin, Mo.; Secretary and Treasurer, P. W. Markham, Brookfield, Mo.

National Commercial Gas Association.—Annual meeting and gas show, Dec. 1-6, 1913. Philadelphia, Pa. Officers: President, C. W. Hare, Philadelphia Pa.; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, St. Louis, Mo., May 19 and 20, 1914; Officers: President, E L. Brundrett, Kansas City, Mo; Secy-Treas., T. Clive Jones, Delaware, O.

New England Gas Association.—Annual meeting, February, 18th and 19th, 1914, Boston. Officers: President, T. H. Hintze, Providence, R. I.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

New Jersey State Gas Association.—Annual Meeting. July —, 1913, Asbury Park N.J. President, C. F. Butcher, Freehold, N. J.; Sec'y-Treasurer, O. F. Potter, Newark, N.J.

Ohio Gas Association.—Annual meeting, February ——— 1914, Columbus, O.; President, John M. Garard, Columbus, O.; Secretary, L. B. Denning, Columbus, O.

Oklahoma Gas, Electric and Railway Association.—Annual meeting, Oklahoma City, May, ——1914. President, F. E. Bowman, Ada; Secretary-Treasurer, H. V. Bozel, Oklahoma City.

Pacific Coast Gas Association.—Annual meeting, San Jose, Cal., September 16, 17, 18, 1913. Officers: President, Henry E. Adams, Stockton, Cal.; Secretary-Treasurer, Henry Bostwick, 445 Sutter street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, Allentown, Pa., April ———, 1914; Officers, President, J. A. Frick, Allentown, Pa.; Secretary-Treasurer, W. O. Lamson, Jr., West Chester, Pa.

Society of Gas Lighting.—Annual meeting Dec., 11, 1913; monthly meetings, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 29 West 39th street, New York city

Southern Gas Association.—Annual meeting, Mobile, Ala., April 4, 1914. Officers: President, James Ferrier, Rome, Ga.; Secretary-Treasurer, E. D. Brewer, Atlanta, Ga.

Southwestern Electrical and Gas Association.—Annual meeting. May———— 1914, Galveston, Tex. Officers: President, G. H. Gifford, Fort Worth Tex.; Secretary H. S. Cooper, 405 Slaughter Bldg., Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May ————1914, Milwaukee, Wis. Officers: President, Ewald Hasse, Milwaukee, Wis.; Secretary-Treasurer, Henry Harmon, Milwaukee, Wis.